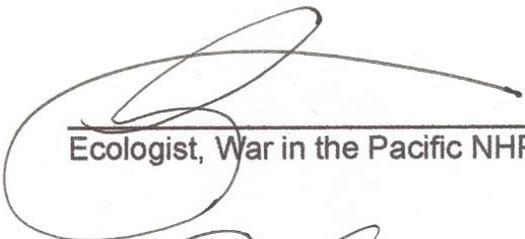


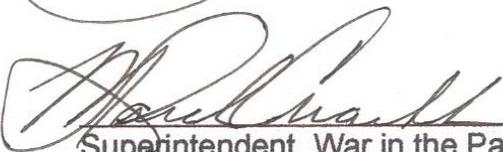
Fire Management Plan

War in the Pacific NHP

Territory of Guam

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I. INTRODUCTION

A. Reasons for Fire Management Plan

1. This plan is written as an operational guide for managing the site's wildland fire and prescribed fire programs. It defines levels of protection needed to ensure safety, protect facilities and resources, and restore and perpetuate natural processes, given current understanding of the complex relationships in natural ecosystems. It is written to comply with a service-wide requirement that parks with vegetation that can support fire develop a fire management plan and a fire management program reflecting local ecology (Director's Order # 18, Wildland Fire Management, 1 / 17/98).

B. Summary of Collaborative Process

1. With the help of the Pacific West Region Fire Management Office, War in the Pacific National Historical Park developed a draft Fire Management Plan. War in the Pacific's General Management Plan (1983), as well as the Resource Management Plan (1997) provided the general direction for the park as well as the fire management program. The Resource Management Specialist will meet annually or as needed with representatives from the Guam Division of Forestry (GFD) to discuss cooperative agreements. This document also addresses primary issues of concern raised during a series of internal and public scoping sessions.

C. Fire Management Policy Implementation Statement

1. The War in the Pacific NHP Fire Management Plan follows and fulfills provisions of the Federal Wildland Fire Management Policy and Program Review. War in the Pacific NHP has burnable vegetation and this fire management plan is based upon resource management plans and decisions that flow from the long-range General Management Plan for the park.

2. Park partnerships with Guam Fire Department (specifically the Piti Fire Station) and with Guam Department of Agriculture, Division of Forestry are the cornerstones of War in the Pacific's fire management program. Their advice and assistance allows the park to achieve the goals of the 10-Year Comprehensive Strategy to 1) improve prevention and suppression, 2) reduce hazardous fuels, 3) restore fire adapted ecosystems, and 4) promote community assistance

3. Currently, War in the Pacific NHP does not possess sufficient funding to fully implement this plan. The full implementation of this plan will be dependant upon obtaining additional park base funding. At this time,

sections IV.A, IV.C, V.D, and VIII can be implemented without additional funds.

D. NEPA/NHPA Requirements Statement

1. This plan will establish a Fire Management Plan for War in the Pacific NHP. It implements the approved course of action described in the General Management Plan. An Environmental Assessment for this plan is attached in Appendix J. The Finding of No Significant Impact (FONSI) fulfilled the requirements of the National Environmental Protection Act (NEPA) and the National Historic Preservation Act (NHPA).

E. Authorities Statement

1. Authority for fire management is found in 16 USC Sec. 1 (August 25, 1916), which states that the agency's purpose:

".. is to conserve the scenery and the natural and historic objects and the wild life therein and provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

This authority was clarified in the National Parks and Recreation Act of 1978:

"Congress declares that ... these areas, though distinct in character, are united ... into one national park system The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

The authority for FIREPRO funding (normal fire year programming) and all emergency fire accounts is found in the following authorities:

- Section 102 of the General Provisions of the Department of Interior's annual Appropriations Bill provides the authority under which appropriated monies can be expended or transferred to fund expenditures arising from the emergency prevention and suppression of wildland fire.
- P.L. 101-121, Department of the Interior and Related Agencies Appropriation Act of 1990, established the funding mechanism for normal year expenditures of funds for fire management purposes.

- 31 US Code 665(E)(1)(B) provides the authority to exceed appropriations due to wildland fire management activities involving the safety of human life and protection of property.

Authorities for procurement and administrative activities necessary to support wildland fire suppression missions are contained in the Interagency Fire Business Management Handbook. Authorities to enter into agreements with other Federal bureaus and agencies; with state, county, and municipal governments; and with private companies, groups, corporations, and individuals are cited in NPS-20 (Federal Assistance and Interagency Agreements). These include the Reciprocal Fire Protection Act of May 27, 1955 (42 USC 815a; 69Stat 66).

Authority for interagency agreements is found in "Interagency Agreement between the Bureau of Land Management, Bureau of Indian Affairs, National Park Service, US Fish and Wildlife Service of the United States Department of the Interior and the Forest Service of the United States Department of Agriculture" (1996). Authority for rendering emergency fire or rescue assistance outside the National Park System is the Act of August 8, 1953 (16 USC 1b(l)) and the Departmental Manual (910 DM).

II. RELATIONSHIP TO LAND MANAGEMENT PLANNING AND FIRE POLICY

A. NPS Management Policies Statement

1. Direction for management of the park system comes from the National Park Service Organic Act of 1916 (Title 16 USC, Section 1):

"The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations to conserve the scenery and the natural and historic objects and the wildlife therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

NPS fire management policy is expressed in RM- 18, Wildland Fire Management Guidelines (NPS 1999) and Director's Order #18, Wildland Fire Management (NPS 1998). The NPS has taken a lead role in considering fire as a fundamental force in perpetuating natural ecosystems, as stated in Director's Order # 18, "All wildfires may be managed to accomplish resource management goals providing they do not compromise firefighter and public safety."

The Department Manual, DM 9 10 (USDI 1997) states the following regarding wildland fires:

"Wildfires may result in loss of life, have detrimental impacts upon natural resources, and damage to or destruction of man-made developments. However, the use of fire under carefully defined conditions is to be a valuable tool in wildland management. Therefore, all wildfires within the Department will be classified either as wildfire or as prescribed fires.

Wildfires, whether on lands administered by the Department or adjacent thereto, which threaten life, man-made structures, or are determined to be a threat to the natural resources or the facilities under the Department's jurisdiction, will be considered emergencies and their suppression given priority over normal Departmental programs.

Bureaus will give the highest priority to preventing the disaster fire - the situation in which a wildfire causes damage of such magnitude as to impact management objectives and/or socioeconomic conditions of an area. However, no wildfire situation, with the possible exception of threat to human survival, requires the exposure of firefighters to life threatening situations.

Within the framework of management objectives and plans, overall wildfire damage will be held to the minimum possible giving full consideration to (1) an aggressive interagency fire prevention program; (2) the least expenditure of public funds for effective suppression; (3) the methods of suppression least damaging to resources and the environment; and (4) the integration of cooperative suppression actions by other qualified suppression agencies.

B. Enabling Legislation

1. Why Unit was Established

War in the Pacific National Historical Park [WAPA] is located in Guam, a U.S. flag Territory located 3,800 miles west of Hawaii (Figures 1 &2). The park was established in 1978 *"to commemorate the bravery and sacrifice of those participating in the Pacific Theater of World War II and to conserve and interpret outstanding natural, scenic, and historic values and objects on the island of Guam for the benefit and enjoyment of present and future generations"* (§6 of Public Law 95-348, August 1978). War in the Pacific National Historical Park consists of seven separate units lying generally in an arc within the island between the west end of Hagatña and the south end of the village of Agat.

2. Significant Resources of Value

One of the most strategically important U.S. possessions in the Pacific, Guam played a dramatic role in World War II. In 1941, Japanese planes attacked the island within hours of the raid on Pearl Harbor. Guam

surrendered two days later, becoming the first U.S. territory to be occupied by Japan. The Japanese occupied the island until July 1944, when American forces invaded and recaptured the island. Each unit of the park contains specific resources related to World War II in the Pacific. The significance of these resources lays both in their roles in the battle for the recapture of Guam, and in the physical remains of structures and equipment they contain. Protection of park infrastructure: trails, facilities and items of cultural and historical significance are mandated to the park.

The Park occupies a total of 1,960 acres of which 1,002 are underwater. A detailed description of all seven units together with information pertaining to the geography, animal life, access, population history and visitation can be found in the General Management Plan (NPS 1983) and the Natural and Cultural Resources Management Plan (NPS 1988) that have been prepared for the Park.

C. GMP/RMP Goals and Objectives for Fire Management Program

1. The GMP has the goal of maintaining the vegetative cover present just prior to the battle for Guam. This goal has ramifications for how fire may be managed within the confines of War in the Pacific NHP to foster and maintain this cultural landscape.

2. Although no specific resources are mentioned in the enabling legislation for War in the Pacific National Historical Park (Public Law 95-348, 95th Congress, 16 U.S.C., 410 cc) the General Management Plan (GMP) is derived directly from Section H of the Act. Relative to fire management, the GMP lists the following management objectives:

a) "Preserve and manage important geographical and historical features within the park in order to provide a setting with sufficient historical integrity to adequately interpret the battle for Guam as an example of the land-by-island fighting in the Pacific war battles."

b) "Preserve and interpret important natural features such as native plant communities and stream and marine bed environments for public use and enjoyment."

D. Statement of How FMP Will Help Meet GMP/RMP Goals and Objectives

1. The fire management objective of suppressing all wildland fires within park boundaries will significantly reduce the effects of soil erosion and the resultant sediment transport to offshore reefs by minimizing impacted acres.

2. Proposed fire management research on the impacts of fire on vegetation and long-term soil stability will enhance protection of valuable land and water resources.
3. Limited prescribed fire – pile burning, will help reduce heavy fuel loads in Wildland-Urban Interface (WUI) zones and help protect park resources from large scale fire effects.

III. WILDLAND FIRE MANAGEMENT STRATEGIES

A. General Management Considerations

1. Current fire management activities include fire suppression only. Management of natural ignitions for resource benefit is not feasible at War in the Pacific because of the small size of the sites and the number of sensitive resources. It would be difficult to contain a natural fire within the boundaries of the park. All unplanned ignitions, both lightning-caused and human-caused, are suppressed to protect sensitive park resources, as well as to prevent damage to neighboring private lands. The park has the responsibility for fire suppression but currently relies on local fire agencies to conduct fire suppression activities.
2. A very limited prescribed fire program, focusing on pile and burning of hazardous fuels may occur, as needed, at War in the Pacific NHP. Expanded use of prescribed fire could be initiated when the need arises, but not without completing an Environmental Screening Form.

B. Wildland Fire Management Goals

1. The overall goals for fire management are to promote a program to ensure firefighter and public safety, aimed at reducing human-caused fires and to ensure appropriate suppression response capability to meet expected wildland fire complexity. Specific fire management goals are:
 - a) Protect human life, property, and the cultural and natural resources of the Park from wildfire.
 - b) Employ strategies to suppress all wildland fires, which minimize costs and resource damage, consistent with values at risk.
 - c) Prevent unplanned human-caused ignitions.
 - d) Promote public understanding of fire management programs and objectives.

- e) Preserve and restore the historic scene.
- f) Protect natural and cultural resources and intrinsic values from unacceptable impacts attributable to fire and fire management activities.
- g) Prevent all fires from burning onto adjacent land.
- h) Conduct fire management programs in a manner consistent with applicable laws, policies and regulations.

These goals are consistent with regional and national strategic plans such as the 10-Year Comprehensive Strategy and National Park Service Strategic Plan, as well as wildland fire policy.

C. *Wildland Fire Management Options*

1. Wildland Fire Suppression

All unplanned wildland fires will be suppressed in a prompt, safe, aggressive, and cost-effective manner to produce fast, efficient action with minimum damage to resources.

Although resource impacts of suppression alternatives must always be considered in selecting a fire management strategy, resource benefits will not be the primary consideration at War in the Pacific NHP. Appropriate suppression action will be taken to ensure firefighter safety, public safety, and protection of the resources.

Critical protection areas, such as historic structures, site facilities, and private residences near boundaries will receive priority consideration in fire control planning efforts. In all cases, the primary concerns of fire suppression personnel shall be firefighter safety, and if needed, all individuals not involved in the suppression effort may be evacuated.

Suppression strategies should be applied so that the equipment and tools used to meet the desired objectives are those that inflict the least impacts upon the site resources. The fire suppression strategy by its very nature is a response to an emergency situation. It is in these situations that an Incident Commander's decisions can have long-term negative implications on natural and cultural resources.

Minimum impact suppression strategies will be employed to protect all resources. Natural and artificial barriers will be used as much as possible

for containment. If necessary, fire line construction will be conducted in such a way as to minimize long-term impacts to site resources.

Vehicle access to normally closed areas of the site will be made using existing fire roads when possible. Heavy equipment such as crawlers, tractors, dozers, or graders will not be used in the site unless their use is necessary to prevent a fire from destroying privately-owned and/or government buildings and historic resources and will be allowed to operate only after approval of the Supt or Acting Supt has been given.

Sites impacted by fire suppression activities or by the fire will be rehabilitated as necessary, based on an approved course of action for each incident.

2. Prescribed Fire

The Prescribed Fire program at War in the Pacific NHP will be limited to pile burning. Results of research on reef health may allow for more management use of fire, if it is determined that there is not a causal relationship between the effects of fire on the landscape and sediment impacts to offshore reefs. Treatment of hazardous fuels near park infrastructure and wildland/urban interface areas would be accomplished using a pile and burn strategy.

3. Wildland Fire Use

Due to the small size of park units and the potential for fire to spread beyond park boundaries into areas not willing to accept fire there will not be wildland fire use projects in the park.

4. Nonfire Applications

There will be hazard fuel reduction projects that will consist of cutting vegetation by hand or machine and piling the slash for later disposal. In some instances a chipper may be used to reduce the configuration of the fuel bed.

D. Wildland Fire Management Strategies by FMU

1. FMU Designation

There are two fire management units in War in the Pacific NHP, The Urban Interface FMU and the Wild Area FMU. Discussion of these two FMUs will be blended due to the same general characteristics occurring in both areas. This will reduce receptiveness in the document.

Urban Area FMU: All of these units are located adjacent to communities where the values at risk outside of the park are high. Response to wildland fires in these units are from the local fire departments. In the event that local fire units cannot reach the fire because of terrain. Attack on fires would be carried out by the GDF. Units of the park included in this FMU are: Asan Beach, Asan Inland (adjacent to Asan village), Piti Guns, Fonte Plateau, Mt. Alifan (adjacent Agat village), Apaca Pt., and Ga'an Pt..

Wild Area FMU: These units are rather isolated from urban growth areas, and initial attack on fires would be carried out by the Guam Department of Forestry. Units of the park in this FMU are: Asan Inland (inland from Asan Village), Mt. Alifan (inland from Agat village), and Mt Chaochao, and Mt. Tenjo.

2. Objectives for FMUs

- Objective: Control 90 percent of all wildland fires before they can exit park boundaries.
- Objective: Conduct all burning operations in accordance with Federal and territorial smoke management requirements.
- Objective: MIST tactics will be utilized on all wildland fires.

3. Management considerations when operating in Park FMUs are:

- a) Potential for discharge of World War II ordinance within park boundaries.
- b) Crews need to be aware of historical artifacts and the requirement to not remove them during fire suppression operations.

4. FMU Fire Response

- a) Fire response in the Urban Area FMU units would be full suppression, using minimum impact suppression tactics (MIST) when possible.

These units would be the focal point for any hazardous fuels reduction projects that would occur in the park. Projects would be piling and burning of debris and in some instances creation and maintenance of fuel breaks adjacent to communities at risk.

b) Fire response in the Wild Area FMU would also be the appropriate suppression response, but could utilize a confine tactic when appropriate.

5. FMU Climate

The primary fire season for the island is December through July, which is the dry season in Guam. The majority of fires occur between late January and early June. Nevertheless, Guam is tropical in nature and since the temperature and relative humidity remain fairly constant year round, fire can occur at any point in time.

The average temperature on the Island is 81°F with extremes of 64°F and 95°F reported. The yearly average rainfall is about 90 inches of which two-thirds occur from July to mid-November.

Easterly tradewinds are very common with average velocity of 6-10 mph. Guam has a high average relative humidity (50-60%) occurring throughout most of the year, which decreases around 9:00 am each day reaching a minimum between 1:00 and 3:00 pm.

Vegetation in these units is very similar, with lush vegetation covering the landscape. Grasses, brush and many nonnative tree, grass and shrub species cover the landscape.

6. Historic role of fire

a) Early Settlement

There is little doubt that fire has played an important historical role on the Island of Guam. The grasslands or savannas which occupy most of Guam's undeveloped landscape are believed to be mostly, but not entirely, the result of extensive and repeated burning over the past four centuries.

The Chamorro people, earliest known settlers of Guam, were known to have used fire in cooking, making pottery and sharpening tools at the time of the first European contact in 1521. It is reasonable to assume that wildland fires resulted from these activities since fuel beds were probably continuous resembling a more pristine condition. Additionally, since the economy of the Chamorros was based upon farming, including sugar cane production, associated activities such as land clearing and residue reduction would seem to be logically accomplished via fire application (Department of Parks and Recreation, 1976).

The historical role of fire probably assumed its greatest influence on the present day setting of Guam between the period 1521 to 1898. This era

is associated with the occupation of the island by the Spanish. According to Fosberg (1960), the Spanish used fire extensively in the wildlands for the creation and maintenance of pasture land for livestock use. The beginning of the Spanish-Chamorro conflict in 1670 set the stage for the years to come, during which time the Island of Guam was frequented by war and fire up to and including World War II.

b) Modern Day

Today, wildfires occur annually within War in the Pacific National Historical Park, particularly in areas dominated by grasslands, (Department of Agriculture, 1985). Park personnel began collecting data on fire occurrence in 1979 (Table 1). Unfortunately, the acreage consumed by each fire was not measured. According to Josiah (1981), approximately 5 to 10 percent of 83,000 acres of land in Guam under wildland fire protection burns annually. These fire occurrence frequencies suggest that on an annual per unit basis, far more land burns in Guam than anywhere else in the continental United States. The occurrence records which are maintained by the Division of Forestry, Department of Agriculture, Government of Guam, indicate that nearly all of Guam's recent fire history is man caused. Since 1979, fire suppression efforts by the Division have held the average fire size in Guam to about 12 ½ acres. Nevertheless, larger fires have occurred in areas less accessible to suppression forces. Two fires of over 1,100 acres in size occurred adjacent to park lands in 1979 and 1980 respectively (Newman, pers. comm., 1981). Large fires in the more remote acreage on the Island are typical of the increasing incendiary problems within the community (approximately 50% of all fire starts) and are commonly associated with deer poaching activity.

Although lightning does not appear to play a major role in the total number of fire starts, it should not be ruled out as a potential ignition source. Due to the high relative humidity and afternoon heating of the island, thundershowers and associated cumulus cloud buildup prior to darkness is common. This climatic pattern is especially pronounced during the rainy season at which time storm occurrence becomes a daily phenomena. The largest majority of this activity produces the form of heat lightning that typically does not result in ground contact. Nevertheless, according to Gavin (1984) bolt lightning can and does occur although it seems to dissipate once storm cells approach the Island. Historically, lightning fires may have been more frequent than they are today since old growth, limestone forest consisted of large trees with thick canopies in continuous stands and acted as aerial conductors for lightning strikes. In contrast, the Island today has suffered from a long history of disturbance by residents, frequent typhoons and the destructive effects of World War II, thereby destroying the continuity of

fuels required for natural fire occurrence and spread (Fosberg, 1960). There is also the possibility of fire ignition resulting from old World War II ordinance. Some fires may be started from the deterioration of World War II ordinance such as phosphorus shells, etc. Human caused fires are associated with arson, hunting, accidental ignitions, land clearing and beetle nut gathering.

Table 1. Fire Occurrence (Average/year) on Guam from 1979 to 1987

Cause	Number of Fires	% Total	Acres Burned	% Total
Smoking	451	12	1,327	4
Debris Burning	535	15	3,957	11
Incendiary	2,177	59	27,378	76
Other (Children, campfire, etc.)	508	14	3,388	9
Average Total per Year	3,671	100	36,050	100

7. Physical and biotic characteristics of park FMUs

a) Soils

Two separate and very distinct soil types exist within the Park. Limestone soils occupy approximately 15% of the acreage and is typically dominated by native tropical forest (Newman, pers. comm. 1981). Generally speaking, the edaphic properties of these soils are conducive to high water holding capacities.

Lush vegetation, characteristic of the limestone soils, helps to maintain a damp and humid microclimate, and leaves the largest majority of the plant species in both the canopy and understory, intolerant of fire. In contrast, all other soils within the park are of volcanic origin and are believed to be mostly, but not entirely, the result of extensive and repeated burning over many years (Josiah, 1982). The landscape of these soils are dominated by a predominant grassland community and intermittent mosaics of brush and small trees, adapted to the more eroded xeric sites.

Most of the vegetation associated with volcanic soils is coarse and fibrous in nature. Live fuel moistures are generally low throughout the year and large amounts of dead organic matter accumulates annually in the form of ground litter and standing fuel ladders. These conditions together with slope (approaching 60% in the park) promote the spread of fire. For this reason, much of the acreage on the island of Guam has been commonly referred to as "Savanna," the term in itself suggesting a certain degree of fire-dependency. Although the Savanna community

occupies the largest majority of acreage within the park, it is not the dominant cover type on the Island. Nevertheless, it would appear that the gradual encroachment of the vegetation associated with volcanic soils into the second growth tropical forests found on limestone soils outside the park is inevitable. This in part is due to the fact that the weathered volcanic soils are depleted of mineral nutrients needed for good plant growth. Furthermore, real penetration in such soils is usually poor. Without considering the influences of fire on a shift in ecosystem dynamics, it is highly unlikely that the advanced vegetative life found within the tropical forests could now or have ever occupied the volcanic sites without intensive site preparation (Government of Guam, 1983).

b) Vegetation

The single most abundant plant species within War in the Pacific National Historical Park is swordgrass (*Miscanthus floridulus*). This robust native perennial occurs in dense pure stands and can grow to be 10-13 feet (3-4 m) in height. According to Josiah (1982), swordgrass stands which are excluded from fire for a 2-3 year period, produce large amounts of dead organic matter with 1 hr. time lag fuel loads which exceed 20 tons/acre (8.92 tons/ha).

Under truly natural conditions (absence of alien plants and human-caused fire starts), *Dimeria* grass (*Dimeria chloridiformis*) is assumed to be the climax association of Guam's savanna vegetation. The maintenance of these natural savannas was in all likelihood fire dependent to a lesser degree. Under present day conditions, these savannas must now be considered to be fire-climax ecosystems with post-burn increases in the production of swordgrass as the most important perpetuating influence. Grasses that have been introduced to Guam within the last 50 years may, in time, compete with swordgrass on acreage frequently burned. However within the interior of dense swordgrass stands, *Centella asiatica* and *Hyptis capitata* are the only species which have demonstrated the ability to become firmly established given a three year fire return interval. Both of the latter species are small herbaceous plants and under close inspection, are seen as suppressed, shade tolerant species which occupy space in between Swordgrass clumps (Pendleton, 1981).

Swordgrass seems to be ideally adapted to fire (Gavin, 1984). The species reproduces by above ground tillers which sprout from the interior base of the swordgrass clump post burn. Dead organic biomass (annual litter accumulation) tends to be concentrated on the interior of the clumps and provides for complete combustion of the entire plant when exposed to fire. Following each successive burn, the swordgrass clump appears to expand or enlarge through tillering until individual clumps grow together in a dense, monogenous stand. In the absence of fire, the

dominance of Swordgrass savanna is threatened. The species seems to do best in sloping terrain probably due in part to the fact these sites are drier and thus fire prone, and that the preheating of fuels associated with upslope head fires in turn contributes to increased fire intensities. In flat areas where standing water is common and thus fire spread/intensities are lower, *Dimeria chloridiformes* will grow together with Swordgrass. Pendleton (1981) has reported to have seen mixed grasslands outside the park. Where this situation has occurred, the *Dimeria* tufts seem to be largest and most healthy suggesting their dominance of swordgrass on these particular sites.

Even with an objective of full suppression of wildfires within park units, use of the confine strategy should allow enough fire to perpetuate the appearance of swordgrass on many slopes where it existed in 1944.

Successional patterns within and into the swordgrass savanna in the long term absence of fire seems to be dependent on soil type. *Leucaena leucocephala* is the second most abundant species within the park and forms dense thickets on the wetter limestone soils (Gavin, 1984). The shrub or small tree may be of any height up to 10 m, depending on the age and wetness of the location (Fosberg, 1960). A member of the Leguminosae family, this species is a native of tropical America that is mutually tropical. *Leucaena* is considered to be a disturbance species and is now very abundant on roadsides (Kodama, 1981). However, there seems to be debate within the scientific community as to the role that fire plays in the perpetuation or elimination of this species.

According to Smith (1984), tangentangen does not survive repeated fires on the island of Hawaii. The tangentangen of Guam and Koahaole or false Koa of Hawaii are both the same species suggesting that their response to fire may be identical in both areas (Harry, 1981). Nevertheless, discussions with Tunison (1984) suggest that while tangentangen may be harmed by repeated fires in short return intervals and fires of moderate to high fire intensities, light and infrequent surface fires may promote the re-growth of the species through its ability to sprout from damaged root and stem collars. Observations made by Gavin (1984) indicate that in Guam, the degree to which fire may promote the re-growth of the species pertains more to stem density rather than to the expansion of its growth range. This seems to be especially significant when tangentangen exists as an "edge" species on transition soils between the true limestone and volcanic ecosystems. It would appear that under the frequent fire return intervals being encountered at War in the Pacific National Historical Park, tangentangen will be slow to invade the swordgrass savanna. As discussed previously, competition within the swordgrass savannas is limited. However in the absence or decreased frequency of fire, successional

patterns would reverse themselves and over long periods of time, the volcanic slopes of Guam would again be dominated almost entirely by tropical forests. It is believed that prior to the arrival of man on Guam; grassland vegetation had a limited range, restricted primarily to the driest of hilltops (Romeo, 1981). Certainly the high humidities and precipitation characteristics of the Island supports this theory. Outside the isolated pockets of undisturbed palms and ferns, ironwood (*Casuarina equisetifolia*) remains scattered throughout the park's grasslands as a living testimony to these changes away from the original native ecosystem. The resilience of this species today suggests that under natural conditions, it would have occupied a dominant, strongly competitive position within the canopy of tropical forests. One long term goal of vegetative management then at War in the Pacific National Historical Park is to allow enough fire in selected locations to keep ironwood from expanding beyond what existed in 1944.

Ironwood is readily susceptible to fire (Fosberg, 1960). It has been able to colonize swordgrass stands only by out competing the latter species on erosion scars. These scars seem to act as natural fire breaks between the ironwood and other flammable vegetation. Since swordgrass is among the poorest of postburn soil stabilizers, it is likely that ironwood will continue to benefit indirectly from fire; fire will continue to create favorable habitat for the species in the form of erosion scars. Even more important to the continuous existence of ironwood is its growth form. Ironwood trees produce large quantities of foliage in the form of needles that annually fall to the ground and form dense duff layers, thus inhibiting understory development (Romeo, 1981). This lack of understory development acts in limiting the accumulation of standing fine fuels and fuel ladders. Furthermore, fuel parking ratios and continuities within these ironwood needle "mats" are poor and remain damp much of the time (Gavin, 1984). The result is reduction in the number of fires capable of sustaining spread through ironwood stands or fires which fall short of the intensities required for stand replacement.

In conclusion, the preceding discussion has identified plants within the park which currently display sensitivity to fire through various shifts in population dynamics. Likewise, these plants comprise the largest majority of the park's fuel loading. Nevertheless, it should be understood that Guam today supports a very diverse vegetative community. Over the last 50 years, dozens of alien trees, shrubs and grasses have been introduced to Guam for their commercial values as well as for landscaping and soil stabilization. At the present time, only Mission grass or foxtail (*Pennisetum polystachion*) is worthy of mention since it shows signs of establishing a degree of dominance on burned over sites within the Park (Gavin, 1984).

Foxtail occurs exclusively within the southern savannas on Guam. It grows up to 6 feet (2 m) tall annually, but does not produce as heavy a fuel load or as intense fire behavior as swordgrass (Josiah, 1982). Like swordgrass, it thrives on fire and is spreading rapidly throughout drainage ditches and disturbed sites. On marginal swordgrass sites (wetter areas which carry fire of low intensity) foxtail has in fact crowded out the former species. More significant than the species' adaptation to fire is its ability to produce a prolific seed head capable of disseminating seed to great distances. Many botanists on the island of Guam theorize that due to the morphological characteristics of foxtail, it will be just a matter of time before it is able to penetrate even the densest of swordgrass stands (Raulerson, 1984).

c) Unique, Threatened and Endangered Species

Until a complete species list can be compiled for the Park, management should regard areas of tropical forests within the park as having the potential to support threatened or endangered species. The mere existence of such "islands" of tropical native forests is significant in themselves since the percentage of land occupied by this cover type dwindles annually. This is especially true for the southern half of the Island, more specifically War in the Pacific National Historical Park. Given the history of man's activities in southern Guam, it is doubtful that any virgin tropical forests remain (Fosberg, 1960).

Many species unique to Guam but not necessarily threatened or endangered are intolerant of fire and may be gradually disappearing from the Island. Large stands of betel nut palms (*Areca catechu*) are intentionally burned by Islanders desiring better access to this tree's fruit. In the process, many betel nut palms are consumed by fire. *Bikkis tetrandia*, an erect branching shrub, was also probably more widespread than it is today, especially on volcanic soils. Man's activities have limited the inhabitation of this species to exposed limestone cliffaces, free of the fuel loading necessary for sustained fire spread and competition from other species (Caceres, 1981).

The traditional native vegetation most closely associated with the tropics is also present within the park in the form of coconut palms (*Cocos nucifera*) and papaya (*Carica papaya*). Kodama (1981) has suggested that papaya is intolerant of fire and site disturbance. Almost nothing is known about the role of fire in palm tree ecology. In southern California, fan palms are clearly fire-adapted (McHargue, 1969; Frazier, 1977; Voge and McHargue, 1966). Morphologically, these palms are similar to many of the palms which grow on the Island of Guam.

Despite variations in site and differences in natural fire frequencies between the two locations, it would appear that fire is a significant factor

in palm tree ecology. According to Moon and Husari (1984), fire narrows palm trunks, smooths them and removes leaf bases and thatch. Fire may also play a role in seedbed preparation and thinning young palms (McHargue, 1969). When excluded from fire for long periods of time, accumulations of thatch will result in the creation of a highly flammable fuel ladder. Tree mortality can occur when these fuel ladders are ignited and contribute to overly intense burning conditions in close proximity to the apical meristem of mature trees. Nevertheless, under natural conditions palms will not increase in diameter after initial trunk growth, although they continue to grow taller (Frazier, 1977). Palms which display thick columnar trunks with large accumulations of thatch are in all likelihood trees which have not yet been subjected to periodic fire. Palms are known to have survived direct dry lightning strikes in southern California (Moon and Husari, 1984). However, the coconut palms of Guam may be less tolerant of lightning fire since lightning in the tropics is associated with heavy precipitation. If water is allowed to accumulate within cupped, recessed meristems of mature burning palms, the meristematic tissue may boil and lead to palm mortality.

In summary, the continued existence of rare, threatened, and endangered species on Guam and within War in the Pacific National Historical Park may be more dependent on the introduction and competition from commercial and landscaping of alien tree species rather than their periodic exposure to fire. For example, it is estimated that at least 75 alien tree species have been introduced to Guam from Hawaii, Taiwan, and the Philippines within the last 25 years (Scully, 1981). Many of these species are known to be rigorous competitors on their native sites.

E. Specifics of the Wildland Fire Situation

1. Historical weather analysis

a) Fire Weather

The Park does not maintain a weather station and therefore no park-specific observations are available. Significant fluctuations in temperature and relative humidity occur only rarely. Furthermore, the weather on Guam is fairly predictable and consistent between different areas on the Island. Therefore, the Park will continue to depend upon weather observations and predicted burning indices computed by the Guam Division of Forestry for determining appropriate staffing levels and/or prevention patrols. Fire weather predictions will be obtained from a local media source.

The Guam Division of Forestry calculates the Fire Danger Rating for the Island from weather observations taken at 0800 and 1300 hours. Rainfall is measured at 0800 while temperature, relative humidity, and wind speed are determined at 1300. The Fuel State Factor is then determined from the Keetch-Byram Chart, followed by calculation of the Fuel State Index. A drought factor is determined from the rainfall measurement which in combination with the wind speed, determines the Fire Danger rating for that day.

The Guam Division of Forestry calls the National Oceanographic Command Detachment for a forecast of the next day's weather, specifically rainfall and wind. The Fire Danger Rating is then calculated for the next day and disseminated to all media outlets to combine with their weather forecasts.

b) Fire season

The primary fire season for the island is December through July which is the dry season in Guam. In actuality, most fires occur between late January and early June. Nevertheless, Guam is tropical in nature and since the temperature and relative humidity remain fairly constant year-round, fire can occur at any point in time.

2. Fuel Characteristics In Relation to Fire Behavior

Standard fuel models associated with NFDRS (National Fire Danger Rating System) and the Fire Behavior Prediction System have proven to be inaccurate when used in fuel types present on the Island of Guam. Variations of these rating systems were used by land management agencies on Guam and in Hawaii several years ago and were based upon fuel model parameters for southern Florida and Texas grasslands. Although unsuccessful in this endeavor (fuel models grossly over estimated fire severity), the U.S. Forest Service/Department of Agriculture and the Guam Division of Forestry now use a modified system from Australia and Fiji based upon a MK 4 meter developed in 1966 by the Forest Research Institute, Forestry and Timber Bureau, Canberra, Australia. This system has been used since 1978 and has been quite accurate in predicting both the end of the dry season, predicting higher rates than actually experienced. The system is exactly the same as the Australia system except the end result is quadrupled in order to accommodate the heavy fuel loadings in Guam.

a) Asan Unit Fire Behavior Characteristics.

Approximately 30% of the Asan Unit is dominated by the Volcanic Savanna Grasslands/High Fire Danger vegetation type, 10% in the

Exotic/Moderate Fire Danger vegetation type, and the remaining 60% in the Limestone Tropical Forest - Manicured or Turf/Low Fire Danger vegetation type.

Needless to say, grassland fuel loadings encourage extreme fire intensities and erratic, spotty fire behavior characteristics. According to Josiah (1982), fires in pure swordgrass stands on level terrain with a 10-15 mph (16-24 km/h), wind at 88°F can support flame heights of 30 to 45 feet with rates of spread approaching 33 sq. feet (8-10 m) per minute. Therefore it is reasonable to assume that such conditions will present themselves on fires within the Asan Inland FMU since swordgrass is the primary component of the Grassland/High Fire Danger vegetation type and slopes approach 60% in the eastern half of the Unit. Furthermore, the weather conditions and their associated fire behavior characteristics described by Josiah are the norm rather than the exception within the Asan Unit, due to the aspect, solar insolation and brisk ocean trade winds influencing this acreage.

With respect to the remainder of the Asan Inland FMU, fire behavior within Exotic and Limestone Tropical Forests vegetation types is considered to be less flagrant although periods of extended drought can influence and produce unexpected conditions when fire spreads from nearby grassland communities. Although slopes may approximate 30% within acreage dominated by either type, high relative humidity and increased soil moisture typical of these ecosystems should help to prevent fire spreads of more than 10 sq. feet (3.09 m) per minute. Since the largest majority of this vegetation is perennial in nature, sustained crown fires are rare with surface fires able to support 3-5 ft. (0.93-1.54 m) flame heights (Gavin, 1984).

b) Mt. Alifan Fire Behavior Characteristics.

Approximately 57% of the Mt. Alifan Unit is dominated by the Volcanic Savanna Grasslands/High Fire Danger vegetation type, 15% in the Exotic/Moderate Fire Danger vegetation type and the remaining 28% in the Limestone Tropic Forest/Low Fire Danger vegetation type.

In general, fire behavior characteristics of each vegetation type in this Unit are expected to be identical to that described on page 27. However, slope is not a major influence on fire behavior since it is gentle throughout much of the Unit and approaches 50-70% only on the southwest boundary, acreage that is dominated by the Low Fire Danger vegetation type.

c) Piti Guns Fire Behavior Characteristics.

Approximately 74% of the Unit is dominated by the Exotic/Moderate Fire Danger vegetation type, with the remainder of the Unit dominated by small intermittent pockets turf, limestone forest and/or grasslands savanna. Although most of the Unit is capable of sustaining fire spread, a considerable amount of site disturbance has taken place in the past and has influenced spotty fire behavior.

d) Mt. Tenjo - Mt. Chachao Unit Fire Behavior Characteristics.

All of the FMU is dominated by the Volcanic Savanna Grassland/High Fire Danger vegetation type. Fire behavior can be expected to be unpredictable since for the most part, fires will be greatly influenced by upslope winds and aspect.

3. Control Problems and Topographic Features

Control problems exist due to the thickness of the vegetation, making it very difficult to access certain areas of the park. Topographic features such as cliffs and steep slopes also inhibit access.

IV. WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS

A. General Implementation Procedures

All unplanned wildland fires will be suppressed in a prompt, safe, aggressive, and cost-effective manner to produce fast, efficient action with minimum damage to resources, using fire suppression resources from the Guam Department of Forestry and/or the Guam Fire Department. This plan does not recommend wildland fire managed for resource benefit as an option for any of the units. Wildland fires will be suppressed using the appropriate suppression response.

B. Fire Suppression

1. Range of Potential Fire Behavior

Fire behavior in War in the Pacific ranges from moderate 3-5 foot flame lengths with slow rates of spread to more extreme 35-40 foot flame lengths and high rates of spread found in sword grass stands.

2. Preparedness Actions

Preparedness is the work accomplished prior to fire occurrence to ensure that the appropriate response, as directed by the Fire Management Plan, can be carried out. Preparedness activities include budget planning, equipment acquisition, equipment maintenance, equipment inventory, personnel qualifications, and training. The preparedness objective is to have an individual(s) who can assist in the management of all fire situations within the site providing a valuable link relating the parks fire management goals to cooperating firefighting agencies..

Preparedness activities are outlined in RM-18 and are covered by normal site operating funds and possibly FIREPRO funding. Preparedness efforts are to be accomplished in the periods outside the normal fire season dates. When periods of high fire danger occur outside the normal fire season dates, the appropriate action will be taken, severity funding may be requested by the Pacific Islands FMO and the Regional FMO will be notified by telephone for approval of the preparedness actions.

The following preparedness actions will be taken to ensure adequate fire preparedness.

3. Fire Prevention Program/Education and Information

An active fire prevention program will be conducted in conjunction with other agencies to protect human life and property, and prevent damage to cultural resources or physical facilities.

A program of public education regarding potential fire danger will be implemented. Visitor contacts, bulletin board materials, handouts and interpretive programs will be utilized to increase visitor and neighbor awareness of fire hazards.

It is essential that employees be well informed about fire prevention and the objectives of the site's fire management program. Further, employees must be kept informed about changes in existing conditions throughout the fire season.

Trained employees and or cooperators need to relate information to the public essential to understanding the potential severity of human-caused wildland fires and how to prevent them.

During periods of extreme or prolonged fire danger, fire prevention messages will be included in interpretive programs. Emergency restrictions regarding fires or area closures may become necessary. Such restrictions, when imposed, will usually be consistent with those implemented by cooperators. It is recommended that a Fire Analysis Committee is formed to recommend to the Superintendent when such restrictions are necessary. Closures will be authorized by the Superintendent.

4. Annual Training

Departmental policy requires that all personnel engaged in suppression and prescribed fire duties meet the standards set by the National Wildfire Coordinating Group (NWCG). The National Park Service wildland fire qualification system meets or exceeds all NWCG standards. War in the Pacific NHP will conform strictly to the requirements of the NPS wildland fire management qualification and certification system.

The Fire Management Specialist will maintain a list of all employees who are qualified for fire duties. The list will include the date of the most recent pack test, the score, and the jobs for which they are qualified. Updated fire training, experience, and physical fitness records will be input annually.

Fire suppression is an arduous duty. On prescribed fires, personnel may be required to shift from monitoring activities to suppression. Poor physical condition of crewmembers can endanger safety and lives during critical situations. Personnel performing fire management duties will maintain a high level of physical fitness. This may require successful completion of a fitness pack test as outlined in NPS-57 (Health fitness guidelines).

A fire cache capable of supplying a minimum for initial attack forces will be established and maintained. The Fire Management Specialist will be responsible for the cache.

Additional equipment and supplies are available through cooperators and the interagency cache system. Requests for additional personnel and equipment are made through the Dispatch for the area. The contact list can be found in the Appendix.

5. Fire Weather and Fire Danger

a) Weather Station Information

The Park does not maintain a weather station and therefore no park-specific observations are available. Significant fluctuations in temperature and relative humidity occur only rarely. Furthermore, the weather on Guam is fairly predictable and consistent between different areas on the Island. Therefore, the Park will continue to depend upon weather observations and predicted burning indices computed by the Guam Division of Forestry for determining appropriate staffing levels and/or prevention patrols. Fire weather predictions will be obtained from a local media source.

b) NFDRS

The Guam Division of Forestry calculates the Fire Danger Rating for the Island from weather observations taken at 0800 and 1300 hours. Rainfall is measured at 0800 while temperature, relative humidity, and wind speed are determined at 1300. The Fuel State Factor is then determined from the Keetch-Byram Chart, followed by calculation of the Fuel State Index. A drought factor is determined from the rainfall measurement which in combination with the wind speed, determines the Fire Danger rating for that day.

The Guam Division of Forestry calls the National Oceanographic Command Detachment for a forecast of the next day's weather, specifically rainfall and wind. The Fire Danger Rating is then calculated for the next day and disseminated to all media outlets to combine with their weather forecasts.

c) Step up Plan description

Manning Class	Fire Danger Rating	Burning Index	Action Indicated
1	Low	1-5	No special staffing required. Park operates under normal conditions and procedures.
2	Moderate	6-12	No special staffing required. If present, Fire Cache and equipment checked and in readiness.
3	High	13-28	All fire equipment including fire packs ready for immediate use. Extended duty coverage may be authorized by Supt. to provide late afternoon/evening fire prevention patrols.
4	Extreme	29+	As in Manning Class 3 above, in addition to which periodic radio or telephone contact will be maintained with the Guam Div. Of Forestry. Fire prevention patrols will be increased. All open fires may be prohibited, and specific areas within the Park closed to the public by the Supt. All forestry technicians will have a 5 min. getaway time.

6. Pre-attack plan

Initial attack on park fires may be provided by qualified NPS, Guam Fire Department or Guam Department of Forestry depending on size and location of the fire. Qualified fire personnel within the park are limited and initial and extended attacks on a fire may be impractical by park employees. The Fire Management Specialist is responsible for ensuring that interagency agreements are reviewed annually and will schedule preseason meetings with cooperators as required.

7. Initial attack

Priority for Initial Attack (IA) resources will be to focus on those fires that pose an immediate or eminent threat to life and property. Those areas with developed infra-structure as well as onsite artifacts will receive priority over undeveloped areas.

- a) Criteria for the appropriate IA response consistent with GMP/RMP objectives

IA response will be to minimize damage to park infra-structure, cultural artifacts and other important historical resources, as well as keeping the fire from leaving the park on to adjoining properties.

- b) Confinement as an IA suppression strategy

Confinement can be used as a suppression strategy for initial attack to meet fire management objectives, i.e. safety of suppression personnel, firefighting cost savings or for prioritization of suppression resources. Confinement cannot be used to meet resource objectives.

Confinement can be a strategic selection through the Wildland Fire Situation Analysis (WFSA) process when the fire is expected to exceed initial attack capability or planned management capability.

When confinement is selected as the initial action the same process applies as for wildland fire use decisions. A long-term implementation plan is needed to guide the implementation of the confinement strategy. The WFIP prepared in stages meets this requirement.

Confinement in the park will only be used when there are reliable barriers to spread. A majority of the fire suppression responses will be full suppression utilizing a control tactic.

c) Restrictions and special concerns by management areas

Impacts from suppression actions will need to be minimized using MIST guidelines. Use of bulldozers will be restricted unless approved by the superintendent or acting superintendent. Throughout the park is the potential for unexploded WWII ordinance, initial attack forces need to be aware of this fact.

Extended attack and large fire suppression occurs when a fire has not been confined, contained or controlled by initial attack forces. The extended attack continues until either the transition to a higher level incident management team is completed or the wildfire has been contained or controlled.

d) Wildland Fire Situation Analysis (WFSA) Development

A WFSA will be completed by the Fire Management Specialist with the assistance of Park Staff when a fire escapes initial attack. Current and predicted fire activity will be determined, management alternatives for suppression actions offered, the effects of wildland fire suppression efforts analyzed, and specific direction to the Incident Commander provided.

e) Complexity Decision Process for Incident Management Transition

The Fire Complexity Assessment checklist will be completed when a wildfire escapes initial attack and necessary resources will be documented on a Resource Order Form (NFES-1470).

When an Incident Management Team is assigned, the team will be briefed by the Superintendent (Agency Administrator's Briefing) and current IC. The team will be given a written delegation of authority and will have an Agency Administrator's Representative assigned as a staff member to the incoming IC. The delegation of authority will provide the IC with the Agency Administrator's priorities, specific restraints, and other guidelines necessary to implement the Delegation of Authority.

f) War in the Pacific Delegation of Authority Form

A copy of War in The Pacific Delegation of Authority form is found in Appendix D.

g) Exceeding Existing Wildland Fire Implementation Plan (WFIP)

At all times when a wildland fire exceeds the existing WFIP a Wildland Fire Situation Analysis must be completed. Reasons for exceeding the WFIP could be for the following reasons:

- 1) Wildland fires cannot be controlled during the initial attack response.
- 2) The appropriate management response has not been successful.
- 3) A prescribed fire has exceeded its prescriptive parameters and is not likely to be brought back into those parameters within a short timeframe.

h) Minimum Impact Suppression Tactics

The goal of MIST is to minimize fire suppression impacts on the land while ensuring the actions taken are safe, timely and effective. Strategies for suppression activities and tactical operations will be planned to have the least long-term impact to the resource. All fire management activities within the War in the Pacific NHP should adhere to MIST where possible.

i) Rehabilitation Guidelines

On May 5, 2003 the Department of the Interior issued an interim policy for wildland fire Emergency Stabilization and Rehabilitation (ESR) in a memorandum titled *“Wildland Fire Emergency Stabilization and Rehabilitation Policy and Procedures”*. This interim policy is to remain in effect until a new 620 Departmental Manual (DM) Chapter 3 is issued. The interim policy also provides direction for rewriting the DM, funding of wildland ESR projects, and provides changes to the funding and documentation of projects in FY 2004.

Every effort should be made to prevent excessive human-caused impacts during a suppression effort through careful planning and supervision, individual education and commitment, and the use of minimum impact suppression techniques.

When rehabilitation is necessary, efforts will be initiated by the Incident Commander while the fire is being suppressed and through mop-up. If performed after the incident, the Chief Ranger will designate an employee, usually a Fire Management Specialist, to organize and direct rehabilitation efforts. However, it is not the intent of ESR to stop all erosion or eradicate all non-native species that may appear following a fire. The ESR program should focus only on mitigating significant damage (RM18 1999).

ESR plans must be submitted to the regional office within five (5) calendar days following control of a wildfire (RM18 1999).

If revegetation or seeding is required, only native plant species will be utilized and the Park's Resource Specialist will be consulted. Rehabilitation planning for each fire will be the responsibility of the Incident Commander in consultation with the resource advisor. Rehabilitation of fire suppression damage should be performed prior to complete demobilization.

ESR is a long-term commitment to protect resources, which occurs outside of the suppression organization.

j) Fire Management Record Keeping

1) **Permanent Park Records.** The following will be held as permanent historic resource records:

- Fire reports (DI-1202, supplementary reports, ICS forms).
- Fire weather records.
- Historic records of the park, including photos or maps showing vegetative cover, etc.
- Monthly reports or other records which document fire occurrence or behavior.
- Maps or records pertinent to fire management.

2) **Situation Reports.** Situation reports contain current information about fire danger, fire status, and resource availability. Parks prepare situation reports during the fire season or when (1) fire danger is very high or extreme, (2) when a fire has occurred or is in progress, (3) or when required. The Fire Management Specialist prepares and transmits situation reports via the Shared Access Computer System (SACS). Since situation reports are used in the FirePro needs analysis, it is important that daily entries be made for all fires.

3) **Fire Report Records.** Each fire of significance (1 acres or greater) on federal property within the War in the Pacific NHP will be reported immediately to the Superintendent by name, location and size. An ICS-209 report will be accomplished twice daily for extended fire situations. A DI-1202 will be completed for all fires that occur inside of the designated NPS boundary. The fire reporting process is a critical element within the FirePro analysis and must accurately reflect the fire load of the War in the Pacific NHP.

The IC will maintain a complete accountability of fire costs for each fire. If possible, a qualified cause and origin fire investigator will investigate all human-caused wildland fires within War in the Pacific NHP. Any investigations involving potential claims against the government, trespass fires, or other illegal activities on federal lands will be immediately turned over to the Law Enforcement Branch of the Resource Protection Division.

Completion of the Individual Fire Reports is the responsibility of the ranking National Park Service employee on scene of the wildland fire. These reports will be submitted to the Pacific Islands Fire Management Officer within 48 hours after the fire is declared out. Within 10 days individual fire reports will be entered into SACS.

An NWCG qualified fire investigator will be assigned to fires where a responsible party can be identified. A Case/Incident Record (Form 10-343) will be completed, with attachments, to document the fire activities. A case report is required when a potential suspect can be identified, if a claim for recovery of suppression costs may occur, or when resource damage has occurred to federal property.

C. Wildland Fire Use

At this time, wildland fire use is not an option at War in the Pacific NHP

D. Prescribed Fire

Prescribed fire projects will consist of a small research project, determining the impacts of sediment on offshore reefs due to wildland fire, and burning of piles generated in hazard fuel reduction projects. There will not be a prescribed fire program in the park other than these two scenarios in the next five year period.

E. Non-fire Fuel Treatment Activities

Non-fire fuel treatment applications are generally constricted by access and cultural restrictions. Where appropriate collaboration with other landowners will occur, with the intent of developing joint projects for the benefit of all parties.

Annual activities required to prepare for implementation of current non-fire fuel treatment applications will be to insure monitoring projects are in place prior to implementation as well as checking for all other mitigation measures developed through compliance procedures.

Verification of contracts for work to be accomplished as well as issuance of new contracts will need to be completed prior to field season. In the case of NPS equipment, said equipment will be maintained and ready for work by field season.

Cost accounting will be accomplished through FSS accounting system, with implementation of contracts through IDEAS and project development through NFPORS

Those individuals chosen to operate mechanical equipment in time for project initiation will complete all equipment qualification standards.

Reporting requirements will be as follows:

- Original plan
- All Maps
- Copies of Contract(s) if applicable
- Permits needed
- Monitoring data
- Unit Logs of COR/CO if applicable
- Press releases, Public comments and Public complaints when appropriate
- Post project review and monitoring report(s)

F. Emergency Rehabilitation and Restoration

Emergency rehabilitation and restoration will be accomplished in accordance with current policy and through the use of the Interagency Burned Area Stabilization and Rehabilitation Handbook.

V. ORGANIZATIONAL AND BUDGETARY PARAMETERS

A. Organizational Structure of the Park (Fire roles and responsibilities)

The Fire Analysis Committee consisting of the Fire Management Specialist/ Chief Ranger, Pacific Islands FMO, and Chief of Maintenance will meet as needed to review wildland fires, coordinate actions, develop alternatives, perform annual reviews of the fire management program and Fire Management Plan, and present them to the Superintendent for approval. Guidelines for their work are those established for the Wildland Fire Situation Analysis (WFSA).

B. FIREPRO Funding

The Pacific Islands FMO manages budgets for both allocated and emergency fire accounts. The Pacific Islands FMO consults with Regional fire management staff

on fire management program or possible FIREPRO funding. War in the Pacific NHP does not submit an individual FIREPRO funding request due to the lack of wildland fire activity.

War in the Pacific NHP will participate in the Fire Program Analysis budgeting system when that system becomes operational.

C. Fire Management Organization

1. Superintendent

The Superintendent is responsible for managing wildland fire programs according to Department policy, RM-18, and policy updates. Major wildland fire management duties include:

- a) Approves the Fire Management Plan and any revisions.
- b) Sole authority to approve prescribed burn plans.
- c) Select and approve action alternatives from among those developed by the Fire Analysis Committee when needed (i.e., WFS process).
- d) Provide direction directly to Type I and Type 2 incident commanders working in a park area, or designate a representative to do so, as needed.
- e) Delegates specific authority to Fire Management Specialist for mobilizing equipment and personnel.
- f) When needed, coordinate with adjacent land managers to establish a Multi-Agency Coordination Group to develop objectives and priorities on fires involving multiple ownership or jurisdiction.

An Acting Superintendent is delegated all decision making responsibility when the Superintendent is absent from the site and unavailable for contact.

2. Acting Superintendent

An Acting Superintendent is delegated all decision making responsibility when the Superintendent is absent from the site and unavailable for contact.

3. Fire Management Specialist

The Fire Management Specialist oversees the fire management program and ensures its coordination with emergency services and resource management programs. The Fire Management Specialist has direct responsibility to plan and implement the site's suppression and preparedness plans. The Major duties related to wildland fire include:

- a) Chair the Fire Analysis Committee, to review fire management situations as needed.
- b) Approve and implement any fire-related use restrictions.
- c) Conduct reviews of fires as specified in this plan.
- d) Ensure fire equipment readiness during fire season.
- e) Oversee initial attack fire operations and within delegated authority arrange for additional equipment, personnel and logistical support as needed.
- f) Call Fire Analysis Committee to meet as needed. Prepare WFSA after developing alternatives and estimating probability of success.
- g) Coordinate off-park dispatches of personnel
- h) Inform and consult with Pacific West Region (PWR) FMO when a fire reaches 10 acres.
- i) Monitor fire danger conditions, implement step-up plan activities, and recommend appropriate use restrictions.
- j) Ensure completion of fire reports and other administrative records.
- k) Serve as liaison with other agencies regarding wildland fire activities.
- l) Prepare fire reports, route for signature and maintain fire records, including fire reports, dispatch fire reports, weather information, resource orders, and situation and fire reports as needed.
- m) Prior to fire season, update lists of contact phone numbers.

4. Pacific Islands FMO

The Pacific Islands FMO for War in the Pacific NHP is located at Hawaii Volcanoes NP. This position has direct responsibility to advise the War in

the Pacific Fire Management Specialist in all planning and implementation of the site's fire activities. The Major duties related to fire include:

- a) Develop or review prescribed burn objectives and monitor post-burn fire effects. Establish burn monitor plots, as needed. Identify areas of potential benefit from prescribed fire.
- b) Manage budgets for both allocated and emergency fire accounts.
- c) Develop, update and/or review fire plans, including implementation or assistance in prescribed burn plans.
- d) Provide for development of fire qualifications for selected employees and make them available during on-going fires.

5. Administrative Officer

The Administration Officer manages administrative functions including personnel, procurement, budget, and phone and computer support. The main duties of the position related to fire management are:

- a) Provides emergency procurement assistance for on-going fires.
- b) Provides services in timekeeper, travel, and budget clerks for fire management.
- c) Assist in gathering and displaying information regarding site resources for fire management activities.
- d) Provide communications with field fire personnel as needed.

D. Interagency Coordination

War in the Pacific NHP is developing good working relationships with local land management agencies, the Fire Management Specialist being the primary liaison for wildland fire. Cooperative agreements with various Guam fire protection agencies as well as Department of Defense fire departments generally provide that resources of each agency are available to assist in initial attack efforts.

War in the Pacific NHP will use the Incident Command System (ICS) as a guide for fireline organization. Qualifications for individuals is per NPS Wildland Fire Qualifications and Certification System, part of NIIMS and the National Wildland fire Coordination Group (NWCG) Prescribed Fire Qualification Guide. Depending on fire complexity, some positions may be filled by the same person.

E. Key Agency/Interagency Contacts by Function

Sue Husari, Regional Fire Management Officer, National Park Service, Pacific West Region Office, Oakland CA

John Kraushaar, Deputy Fire Management Officer, National Park Service, Pacific West Region Office, Oakland CA

Richard Smedley, Regional Fire Planner, PWR – Vancouver Office, National Park Service, Portland, OR

Joe Molhoek, Pacific Islands Fire Management Officer, Hawaii Volcanoes NP, Hilo, HI

Dave Limtiaco, Head Forester, Guam Division of Forestry, Guam Department of Agriculture

George Aquino, Fire Chief, Guam Fire Department

Ed Terlaje, Fire Chief, Navy Fire Division

F. Fire Agreements

War in the Pacific NHP currently has no fire agreements in place.

VI. MONITORING AND EVALUATION

All units with fire use must have short and long-term monitoring programs

Monitoring will be a part of all prescribed burns conducted at War in the Pacific NHP. Monitoring programs will be designed to define the effectiveness of the fire management program by assessing fire effects on site vegetation and any associated soil erosion. Post-fire effects monitoring will use sampling techniques described in the Western Region Fire Monitoring Handbook (1992). This level of monitoring permits a quantitative evaluation of whether a stated objective was achieved.

A prescribed fire monitoring plan will be developed if and when a prescribed fire program is implemented.

VII. FIRE RESEARCH

The main goal of fire research at War in the Pacific NHP is to provide information for making fire management decisions. Fire research will be coordinated through the Resource Management staff in the park. Fire effects research will be conducted regarding vegetation, soil, and plant succession. This research will be analyzed and used in the decision making process regarding fire management.

As the Fire Management Plan is implemented and tested, additional research will inevitably be identified for such purposes as refining prescriptions, improving the understanding of fire behavior and fire effects, refining monitoring protocols, defining fire return cycles, describing fuels dynamics, describing the impacts on cultural resources, and other information needed for operational fire and resource management.

VIII. PUBLIC SAFETY

War in the Pacific NHP is dedicated to ensuring the safety of each visitor and to all residents and property adjacent to the park's boundary. The Superintendent may close all or a portion of a park unit (including roads and trails) when wildland fire or a prescribed burn pose an imminent threat to public safety. A prescribed burn that exceeds prescription or extends beyond the predetermined area will be immediately suppressed. Any prescribed burn that is determined to pose a threat after ignition will be immediately suppressed.

In case of a wildfire, park staff will notify the Guam Fire Department and/or Guam Division of Forestry through a 911 telephone call. Fire occurring near paved access roads, or near the WUI (Urban Area FMUs) should be directed the Guam Fire Department. Fires occurring in the Wildland Area FMUs should be directed to the Guam Division of Forestry. The Superintendent designates who would act as a resource advisor to the local Fire District personnel at the park. Park staff would clear any visitors on trails near the fire and conduct them to a safe zone. Park staff will assist Guam Police Department personnel with any necessary traffic control in the impacted area to ensure unimpeded access by the local Fire District's equipment, and park staff may conduct traffic control on entrance/access roads during periods of dense smoke across the road.

During a prescribed fire, park interpreters will post signs in the Visitor Center, per the Prescribed Fire Plan, that informs visitors about a prescribed fire in progress and about smoke in the area. Other information, brochures, knowledgeable staff, etc. will be in the Visitor Center for public information. No person will go into the burn area without personal protective equipment. No visitor will be allowed in the

burn area without the permission of both the Superintendent and the Burn Boss. Park staff would clear any visitors on trails near the prescribed fire and conduct them into other parts of the park. The Superintendent may direct staff to close portions of the park trail system during a prescribed fire to ensure visitor safety.

Areas of fire activity will be clearly designated at the visitor center. Residents adjacent to the site will be notified in advance of any prescribed burn and if any fire poses a threat to burn outside the site's boundaries.

During prescribed burns, at least one burn team member will have first aid training. A first aid kit will be on-site for prescribed burns as well as wildland fires. The local police, fire, and emergency medical services will be notified prior to the ignition of any prescribed burn. They will also be notified of the location of any wildland fires.

IX. PUBLIC INFORMATION AND EDUCATION

Educating the public on the value of fire as a natural process is important to increasing public understanding and support for the fire management program. The interpretation division, in coordination with resource and fire staff, has the primary responsibility for providing this education. The U.S. Forest Service, National Interagency Fire Center, and National Park Service fire information-related web sites have a wealth of information about fire and its role as a natural agent.

The park will use the most appropriate and effective means to explain the overall fire management program. This may include supplemental handouts, signage, personal contacts, or media releases. When necessary, interagency interpretive presentations will address the fire management program and explain the role of fire in the environment. During periods of High Fire Danger, notices will be posted in the Visitor Center and at site bulletin boards. During Extreme Fire Danger periods, all fires are prohibited, including the use of fire grates, grills, and stoves. Restrictions and closures of site areas may be deemed necessary. Interpretive activities will include a fire safety message.

Prior to the lighting of any planned ignition, the Superintendent will make information available to visitors, local residents, and the press about what is scheduled to happen in the site and why. On-site information will be provided to alleviate visitor concern about the apparent destruction of site resources by fire or the impairment of views due to temporary smoke. This information will include prescribed burn objectives and control techniques, current fire location and behavior, effects caused by the fire, impacts on private and public facilities and services, and restrictions and closures within the site.

As outlined in the prevention section, emergency closures or restrictions may become necessary during periods of extreme or extended fire danger. The

Superintendent has authority under Title 36 of the Code of Federal Regulations, Section 1.5 to restrict or temporarily close parts of the park.

X. PROTECTION OF SENSITIVE RESOURCES

The entire park has cultural artifacts of significance and any ground disturbance or alteration of the landscape must have a completed assessment of effect completed in order to comply with the National Historic Preservation Act. Compliance with Section 106 of the National Historic Preservation Act (NHPA, as amended), was accomplished years earlier and will be reviewed by subject matter experts to ensure that Prescribed Burns will have no adverse effect on the park. At present a complete listing of cultural resources is not available and will be required prior to conducting any Prescribed burns in the park. To prevent needless or excessive damage, historians may be consulted during the early planning stages of prescribed fires, where appropriate.

The park resource manager is responsible for ensuring that all compliance measures are completed before ignition. At present a list of sensitive species is not available and will be required prior to conducting any Prescribed burns in the park.

Natural resource compliance must be completed before the ignition of any project, and qualified staff must conducted appropriate reviews and surveys of the project area for plant and animal species of concern prior to ignitions. An Environmental Assessment must be prepared and the Regional Director must approve a Finding of No Significant Impact. Vegetation surveys – baseline and non-native inventory – must not have found any T & E species in the proposed project area.

XI. FIRE CRITIQUES AND ANNUAL REVIEWS

A. FIRE CRITIQUES

Fire reviews will be conducted in accordance with RM- 18. Each review will be documented and filed with the final fire report. The Fire Management Specialist will retain a copy for the site's files.

B. ANNUAL FIRE SUMMARY REPORT

The Pacific Islands FMO will be responsible for completing an annual fire summary report. The report will contain the number of fires by type, acres burned by fuel type, cost summary (prescribed burns and wildland fires), personnel utilized, and fire effects.

C. ANNUAL FIRE MANAGEMENT PLAN REVIEW

The Fire Management Plan will be reviewed annually by the Fire Analysis Committee. Necessary updates or changes will be accomplished prior to the next fire season. Any additions, deletions, or changes will be assessed using the regional environmental screening form as to the need for further compliance documentation, and then reviewed by the Superintendent to determine if such alterations warrant a re-approval of the plan.

XII. CONSULTATION AND COORDINATION

Reviewers of this plan include:

Richard Smedley, Regional Fire Planner, Pacific West Region, National Park Service, Vancouver WA

Sue Husari, Regional Fire Management Officer, Pacific West Region Office, National Park Service, Oakland CA

Paul Reeburg, Fire Monitoring Program Specialist, Pacific West Regional Office, National Park Service, Oakland, CA

Corky Conover, Fuels Specialist, Pacific West Region, National Park Service, Sequoia and Kings Canyon NP

John Kraushaar, Deputy Regional Fire Management Officer, Pacific West Region Office, Oakland CA

Bob Appling, Wildland Fire Specialist, Pacific West Region, National Park Service, Vancouver WA

Mary Beth Keifer, Fire Effects Monitoring Program, Pacific West Region Office, National Park Service, Oakland CA

Nelson Siefkin, Regional Fire Archaeologist, Pacific West Regional Office, National Park Service, Oakland CA

Robin Wills, Regional Fire Ecologist, Pacific West Region Office, National Park Service, Oakland CA

XIII. APPENDICES

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Appendix B (Definitions)

Appropriate Management Response – Specific actions taken in response to a wildland fire to implement protection and fire use objectives.

Appropriate Management Strategy – A plan or direction selected by an agency administrator to guide wildland fire management actions and meet protection and fire use objectives.

Contain – To surround a fire, and any spot fires therefrom, with control line as needed, which can reasonably be expected to check the fire's spread under prevailing and predicted conditions.

Confine – To limit fire spread within a predetermined area principally by use of natural and pre-constructed barriers or environmental conditions. Suppression action may be minimal and limited to surveillance or monitoring under appropriate conditions.

Control – To complete a control line around a fire, any spot fires therefrom, and any interior islands to be saved and cool down all hot spots that are immediate threats to the control line.

Disputed Fire Management Responsibility – Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.

Disputed fire policy – Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

Energy Release Component – A number that expresses the rate of heat release (in BTUs / sec) per unit area (in square feet) within the flaming zone of the fire.

Expected Weather Conditions – Weather conditions indicated as common, likely, or highly probable based on current and expected trends and their comparison to historical weather records. These are the most probable weather conditions for this location and time.

Experienced Severe Weather Conditions Weather conditions that occur infrequently, but have been experienced during the period of weather records. For example, rare weather conditions that significantly influence fires may have occurred only once, but their record can be used to establish a baseline for worst case scenario.

Extended Exposure to Unusually Hazardous Line Conditions – Extended burnout or backfire situations, rock slides, cliffs, extremely steep terrain, abnormal fuel situations such as frost-killed foliage, etc.

Fire Frequency – The historic return interval of fire in a defined environment.

Fire Management Area (FMA) – A geographic area within a Fire Management Unit that represents a pre-defined ultimate acceptable management area for a fire managed for resource benefits. This pre-define area can constitute a Maximum Manageable Area (MMA) and is useful for those units having light fuel types conducive to rapid fire spread rates.

Fire Management Plan (FMP) – A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational plans such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

Fire Management Unit (FMU) – Any land management area definable by objectives, topographic features, access, values to be protected, political boundaries, fuel types, major fire regimes, etc., that sets it apart from the management characteristics of an adjacent unit. FMU's are delineated in Fire Management Plans.

Holding Actions – Planned actions required to achieve wildland and prescribed fire management objectives.

Initial Attack – An aggressive suppression consistent with firefighter and public safety and values to be protected.

Management Action Points – (also called "Trigger Points")-Either geographic points on the ground or specific points in time where an escalation or alteration of management actions is necessitated. These points are defined and the management actions taken are clearly described in an approved Wildland Fire Plan(WFIP) or Prescribed Fire Plan. Timely implementation of the actions when the fire reached the action point is generally critical to successful accomplishment of the objectives.

Maximum Manageable Area (MMA) – The firm limits of management capability to accommodate the social, political, and resource impacts of a wildland fire. Once established as part of an approved plan, the general impact area is fixed and not subject to change.

Mitigation Actions – On-the-ground activities that will serve to increase the defensibility of the Maximum Manageable Area, check, direct, or delay the spread of fire, and minimize threats to life, property, and resources. They can include mechanical and physical non-fire tasks, specific fire applications and limited suppression actions. These actions will be used to construct firelines, reduce excessive fuel concentrations, reduce vertical fuel continuity, create fuel breaks or barriers around critical or sensitive sites or resources, create “blacklines” through controlled burnouts, and to limit fire spread and behavior.

Potential for Blow-up Conditions – Any combination of fuels, weather and topography excessively endangering personnel.

Preparedness – Activities that lead to a safe, effective, and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination. This term replaces pre-suppression.

Pre-existing controversies – These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

Prescribed Fire – Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Prescribed Fire Plan – A plan required for each fire ignited by managers. It must be prepared by qualified personnel and approved by appropriate Agency Administrator prior to implementation.

Prescription – Measurable criteria which guide the selection of appropriate management responses and actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social or legal considerations.

Smoke Management – Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

Threatened and Endangered Species – Threat to habitat of such species, or in the case of flora, threat to the species itself.

Wildfire – An unwanted wildland fire.

Wildland Fire – Any non-structure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Wildland Fire Implementation Plan (WFIP) – A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response to a wildland fire. A full WFIP consists of three stages. Different levels of completion may occur for differing management strategies; i.e., fires managed for resource benefits will have two-three stages of the WFIP completed while some fires that receive a suppression response may have only a portion of Stage I completed.

Wildland Fire Management Program – The full range of activities and functions necessary for planning, preparedness, emergency suppression operations, and emergency rehabilitation of wildland fires, and prescribed fire operations including non-activity fuels management to reduce risks to public safety and restore and sustain ecosystem health.

Wildland Fire Situation Analysis (WFSA) – A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives.

Wildland Fire Use – The management of naturally-ignited wildland fires to accomplish specific, pre-stated resource management objectives in pre-defined geographic areas as outlined in the Fire Management Plan.

Appendix C (Sensitive Species)

The park currently does not possess a flora or fauna inventory

Appendix D (Delegation of Authority)

United States Department of the Interior

NATIONAL PARK SERVICE
WAR IN THE PACIFIC NHP
460 N. MARINE CORPS DR.
PITI, GU 96915

Y14 (WAPA)

Date:

Delegation of Authority for the _____ Incident
_____, Incident Commander

You have been assigned as the Incident Commander for the _____, Fire, SMP# _____, on the War in the Pacific NHP. You have full authority for managing incident operations within the framework of legal statute, current policy, and the direction provided in both your oral and written briefing materials. You are expected to do a complete and efficient job, while providing for SAFETY first. Firefighter and public safety is my primary concern on this incident. Make sure you comply with the 10 Standard Orders and 18 Situations that Shout Watch-out and implement LCES in all your planning processes and suppression efforts. I expect you to follow the 30-mile Fire Accident Prevention Plan.

You are to provide the necessary suppression capability to control this wildfire at a reasonable cost, to meet the objectives specified, and to protect on and off-Park values. You are personally accountable to me. A formal evaluation may require follow up within sixty days after your departure once my staff has had the opportunity to review accountability, claims and documentation, financial matters and protection of resource values. You have the authority to enter into a Unified Command to assure all jurisdictional issues are addressed.

A Wildfire Situation Analysis (WFSA) has been prepared for this incident; it provides direction for the *control strategy*. Review the WFSA each operating period and work with _____ to revise if the selected alternative is no longer appropriate.

Work closely with _____, to understand complex local issues, including jurisdictional questions. Keep my staff informed and work close in proactively dealing with controversial issues. A National Park Service representative will be assigned to your team and this individual will be available to you at all times. I expect my representative to participate in your “preplanning strategy and briefing meetings”, to assure you have key/local information prior to “team briefings”. Our primary fire cooperators are Guam Department of Forestry, the Guam Fire Department and the Department of Defense Fire organization.

Sensitive resource and land management issues are many. Work closely with the park Ecologist and Museum Curator in regard to possible fire suppression rehabilitation and impacts to threatened and endangered species/habitat and cultural resources. In regards to

fire suppression and T&E species protection, keep in mind “Fire Fighter and public safety” is my # 1 priority. The Ecologist and Museum Curator can help you address the protection of these important features.

Sensitive political issues require you to have an aggressive information organization in place. Incident information is your responsibility, but I expect you to keep our Park Ranger apprised of your progress and any emerging issues. Provide for safety, but cooperate closely with the local media. Be responsive to their needs. This fire may also cause adverse air quality impacts in some low-lying urban areas.

Sensitive personnel issues include a proactive response from Administrative Officer assigned to this incident. Ensure that equitable and safe facilities exist for personnel assigned to this incident.

_____ will serve as your Incident Base. Special orders can be prepared to give you the latitude to control entry and egress from incident facilities for unwelcome persons, and prohibit the possession of alcohol or other intoxicants. There is however, no “closed camp” as far as incident personnel are concerned. Please keep my representative informed on issues and concerns as they develop. As the number of federal firefighters assigned to the incident increase, you have the authority to include an appropriate union representative onto the incident.

Cost app will be an important issue for you to manage during this assignment. Berkeley Yoshida is the designated Pacific West Region’s point of contact for cost apportionment. I urge you to include him in your operations. Be sure to follow guidelines for the safe handling and transport of hazardous materials. Be concerned about property accountability (especially Cache equipment/supplies) and potential damage claims. Be efficient in your operations; work close with Park Fire Staff before initiating large orders for resources or implementing costly and mission tasking aviation actions.

Hawaii Volcanoes, Fire Management Officer or War in the Pacific’s representative, will be visiting you frequently. Keep them informed of your decisions, issues and concerns. They will work closely with the Park staff to help resolve any problems you may have. If there are policies or documents that you are unfamiliar with, they can explain or secure them for you.

Team Transition for the fire will be _____, 200X at _____ hours.

If you have any problems or concerns, please contact me. I am available to discuss your needs and or revisit this delegation. I can be reached at:

- Office:
- Home:
- Cell:

NAME
Superintendent

Appendix E (WAPA Unit Summary Chart)

Parcel Name	Fire Mgt. Objectives	Fire History	Control Problems	Values at Risk	Mitigation
1. Asan Beach	Suppress all fires that occur in this unit.	Unavailable. No significant fire issue at this unit	One ridgeline with remnant limestone forest. Primary north-south road (Route 1) forms southern boarder of this unit.	Extensive urban interface with adjacent village. Primary unit of the park used by public. Contains some cultural/historical sites important to the park's core mission, primarily caves and gun emplacements. Site of the park's Liberator's Memorial.	None prescribed. Consulted with Piti Fire Station. Use MIST tactics, if possible, in sensitive habitats.
2. Asan Inland	Suppress fires along the WUI.	Experiences 2-3 fires per year. Fire history data available from 2002-present	Steep slopes, high dry season fuel loads, no road access. Home along the north boundary	Has extensive WUI along the northern boundary. A significant cultural landscape.	None prescribed. Consulted with Piti Fire Station. Use MIST tactics, if possible, in sensitive habitats.
3. Fonte Plateau	Suppress fires along the WUI.	Unavailable		Contains some cultural/historical sites important to the park's core mission, primarily caves, a Japanese WWII headquarters, and culturally significant quarry.	None prescribed.
4. Piti Guns	Suppress all fires that occur in this unit.	Unavailable	Steep slopes with dense forest. Homes along the northern boundary. No road access into the unit.	Extensive WUI along the northern boundary. Mahogany forest is a significant cultural feature. Until also contains several WWII gun fortifications.	None prescribed.
5. Mt. Chachao & Mt. Tenjo	Access makes fire suppress problematic	Unavailable	Steep slopes, high dry season fuel loads, no road access -- unit is ~3miles from nearest road.	Some historical sites are located in this unit, but their exact location and condition are currently unknown.	None prescribed.
6. Mt. Alifan	Suppress fires along the WUI.	Unavailable	Steep slopes, high dry season fuel loads, no road access. Homes along the western boundary	Has an urban interface along the western boundary of the unit. Remnant limestone forest exists on the eastern boarder.	None prescribed. Consulted with Piti Fire Station. Use MIST tactics, if possible, in sensitive habitats.
7. Agat Beach	Suppress all fires that occur in this unit	Unavailable. No significant fire threat at	None identified.	Extensive urban interface with adjacent village.	None prescribed. Consulted with

		this unit		Primary unit of the park used by public. Contains some cultural/historical sites important to the park's core mission, primarily caves and gun emplacements. Apaca area of the unit has adjacent wetlands that require protection.	Piti Fire Station. Use MIST tactics, if possible, in sensitive habitats.
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Appendix F (Fire Complexity Guide and Transition Checklist)

War in the Pacific NHP

FIRE TRANSITION GUIDE

1. Objectives

- All firefighters shall be under the control and direction of supervisors who do not have other duties that distract them from providing adequate oversight for the safety of all the people under their supervision.
- The fire organization increases in both size and qualifications to match the complexity of the evolving fire situation.

2. Establishing Fire Complexity

- Dispatches to reported wildland fire within the park will include an Agency Representative from the park.
- Upon initial attack, the Complexity Analysis and Transition Guide shall be used to determine the appropriate management level of the incident and the Incident Commander's qualifications.

3. Type 5 Incident

- All fires shall be staffed by at a minimum by a qualified ICT4

4. Type 4 Incident

- A type 4 incident is one that can be commanded by a Single Resource Boss (SRB) who is qualified as ICT4 and can conduct both the ICT4 and the SRB duties simultaneously, maintaining communications and command and control of the people under his/her direction at all times.
- Type 4 fires are typically described as small, slow moving fires that require only one or two fire suppression modules and will be contained and placed in patrol status by the beginning of the next burning period. Aircraft may be used on the fire for delivery of firefighters and/or limited aerial tactical support. Aircraft types are normally not mixed. The potential for significant fire growth is low.

5. Type 3 Incident

- A fire must be rated type 3 at any point the ICT4/SRB or Duty Officer determines that he/she cannot conduct both the duties of the Incident Commander while maintaining communications and command and control of the people assigned to the incident.
- Once the ICT4 or Duty Officer identifies the fire complexity has transitioned to the next level of management; one of the following actions will be implemented.
- A dedicated ICT3 will be assigned

6. Required Complexity Analysis for Type 3 and Above Fires

Once an incident has been determined to be a type 3 incident, the Incident Complexity Analysis must be completed to evaluate the current and potential complexity of the fire. This analysis may be completed by any of the following personnel:

- ICT3
- Duty Officer
- Agency Administrator

War in the Pacific NHP INCIDENT COMPLEXITY ANALYSIS

	Definition	YES	NO
1.	Fuels extremely dry and susceptible to long-range spotting or you are currently experiencing extreme fire behavior.		
2.	Weather forecast indicating no significant relief or worsening conditions.		
3.	Current or predicted fire behavior dictates indirect control strategy with large amounts of fuel within planned perimeter.		
4.	Performance of firefighting resources affected by cumulative fatigue.		
5.	Overhead overextended mentally and/or physically.		
6.	Communication ineffective with tactical resources or dispatch.		
7.	150 or more personnel assigned to incident or more than three divisions.		
8.	Incident action plans, briefings, etc. missing or poorly prepared.		
9.	Variety of specialized operations, support personnel or equipment.		
10.	Unable to properly staff air operations/multiple aircraft are involved or anticipated		
11.	Limited local resources available for initial attack.		
12.	Heavy commitment of local resources to logistical support		
13.	Existing forces have worked 24 hours without success		
14.	Resources unfamiliar with local conditions and tactics.		
15.	Urban interface: Structures, development, recreational facilities, or potential for evacuation.		
16.	Fire burning or threatening more than one jurisdiction and potential for unified command with different or conflicting management objectives.		
17.	Unique natural resources, special-designation areas, critical municipal watershed, T&E species habitat, cultural value sites.		
18.	Sensitive political concerns, media involvement, or controversial fire policy.		
19.	Exposure of personnel to unusually hazardous conditions.		
20.	Terrain adversely affects tactical capability – limits safety zones.		
	TOTAL NUMBER OF ELEMENTS CHECKED "YES"		

Complexity Analysis Rating:

1-6 Elements checked "yes". Complexity level suggests a Type 3 Incident.

7 + Elements checked "yes". Complexity level suggests a Type 2 or Type 1 Incident. Once the incident is upgraded to Type 2 or Type 1, a Wildland Fire Situation Analysis is required.

PREPARED BY: _____

TITLE: _____

DATE: _____

Appendix G (Interagency Fire Agreements)

The park currently has no formal agreements in place

Appendix H (Environmental Review Proposal Form)

PROJECT PROPOSAL

To be filled out by project proponent. **Submit two copies of proposal form and support materials to Env'tal Review Coordinator.**

Project Name _____

Funding Source/Fiscal Year Funded/PMIS Number _____

Proposed Start Date _____ Anticipated Duration of Project _____

Location _____

Project Proponent _____

Division Chief Approval _____

PROJECT DESCRIPTION (Include supporting documentation, such as photos, maps, plans, etc. Attach additional sheets if necessary.)

Will the project involve ground disturbance? Yes No

Purpose and need:

Describe any alternatives to the Proposed Project:



Appendix I (Fire Management Organization Chart)

Staff Position	Current Staff	FMP Role
Superintendent	Sarah Creachbaum	Responsible delegation of responsibility during a fire. Oversees cooperative agreements and budget expenditures. Appoints park contact to be his representative with non-NPS fire response units. Insures that the FMP is reviewed and updated as required.
Park Ranger	Rose Manibusan	Oversee public relations associated with all fires and fire management activities.
Landscape Architect	Theo Chargalauf	-
Ecologist	Dwayne Minton	Primary contact for natural resource issue associated with the park's fire program. Serves as the primary natural resource advisor during fires and during fire management activities.
Biological Technician	Position unfilled	-
Museum Curator	Tammy Duchesne	Primary contact for cultural resource issue associated with the park's fire program. Serves as the primary cultural resource advisor during fires and during fire management activities.
Facilities Manager	Position unfilled	Primary contact for facility issue associated with the park's fire program. Serves as the primary advisor regarding park facilities during fires and during fire management activities.
Tractor Operating	Rita Powell	-
Tractor Operating	Position unfilled	-
Administrative Officer	Mary Mesa	Responsible for all NPS budget and personnel issues associated with fire management activities.
Admin. Support Clerk	Position unfilled	-

This park organization chart accounts for all permanent employees at WAPA.

Appendix J (Environmental Assessment)



National Park Service
U.S. Department of the Interior

Pacific West
Regional Office
Oakland

1111 Jackson Street
Suite 700
Oakland, CA 94607
510-817-1300 phone
510-419-0197 fax

PACIFIC WEST REGIONAL OFFICE Memorandum

L7617 (PWRO-P)

OCT 03 2005

Memorandum

To: Superintendent, War in the Pacific National Historic Park

From: Regional Director, Pacific West Region

Subject: Environmental Compliance for Fire Management Plan

The *Finding of No Significant Impact* for the new fire and fuels management program is approved.

To complete this particular compliance effort, when the park announces the approved program a copy of the attachment should be made available to all individuals and organizations that received the supporting environmental assessment.

Patricia L. Neubacher

Jonathan B. Jarvis

Attachment

EXPERIENCE YOUR AMERICA

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

Finding of No Significant Impact
Fire and Fuels Management Plan for
War in the Pacific National Historic Park
Piti, Guam
August, 2005

PURPOSE AND NEED

The National Park Service proposes to implement a fire and fuels management plan for the War in the Pacific National Historic Park (hereinafter called WAPA) to guide WAPA fire management over the next 5 years. Wildland fires have been suppressed on WAPA lands by federal agencies even pre-dating its establishment in 1978. This plan will establish the relationships among fire management objectives, firefighter and public safety, and natural and cultural resource management objectives.

ALTERNATIVES

Selected Action

The selected fire management plan is the Preferred Alternative as described in the environmental assessment. The selected action presents the National Park Service (NPS) proposed action and defines the rationale for the action in terms of resource protection and management, visitor and operational use, and costs.

Suppression with Fuels Treatments Based on Fire Management Units (FMU)

Under this alternative, WAPA would suppress all unplanned ignitions in the Urban Fire Management Units (FMU) and either suppress or confine all unplanned ignitions in Wild Area FMUs. Unplanned ignitions would be suppressed using appropriate management techniques (e.g., MIST). Treatment of hazardous fuels near park infrastructure and wildland/urban interface areas would be accomplished by cutting vegetation by hand or machine and piling the slash for later disposal. In some instances a chipper may be used to reduce the configuration of the fuel bed. A prescription for vegetation removal would be in effect for each mechanical treatment.

Due to the small size of park units and the potential for fire to spread beyond park boundaries into areas not willing to accept fire, there will not be wildland fire use projects in the park.

Current training and experience levels of available staff and fiscal realities do not allow for WAPA to fully administer this plan. Until the park has attained sufficient staff training, expertise and funding, WAPA staff may identify units for treatment, develop proposed treatment prescription, and broaden the baseline information on sensitive park resources.

Other Alternatives Considered

The other alternative considered in the environmental assessment was the no-action alternative. The no-action alternative would be the continuation of existing fire management practices. All wildland fires would be suppressed using appropriate management techniques. Fire suppression personnel would, in a cost-effective manner, seek to limit the spread of all fires as quickly as possible, ensure public and firefighter safety, and protect the park's natural and cultural resources, and protect other private and public property. This alternative was rejected because the results will not meet the three of the project goals:

- Reduce fire hazards in park ecosystems.
- Reduce risk of unwanted wildland fire.
- Reduce adverse impacts of fire management activities on the park's cultural and natural resources.

Environmentally Preferred Alternative

The "environmentally preferred" alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that "the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA Section 101. The environmentally preferred alternative would:

- “1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.”

The selected fire plan alternative is the "environmentally preferred" alternative because it more closely conforms to policies 1-6. Management by FMU, including FMU specific fuel

management and fire suppression would help restore NHP ecosystems and re-establish a more natural fire regime and vegetation. This would protect natural resources for future generations and help protect the surrounding areas from catastrophic fires. Implementation of fuels treatments would also better protect human infrastructure from unwanted fire.

The no-action alternative calls for the suppression of all wildland fires regardless of location and access, requiring the development and installation extensive management and suppression infrastructure (e.g., fire access roads). Therefore, the no-action alternative fails to conform to the policies outlined above.

MITIGATION

Mitigation measures have been incorporated into the selected action (preferred alternative) to reduce impacts as part of the proposed action. All required mitigation measures are summarized in the matrix below.

Impact/Mitigation Matrix

Impact Topic	Mitigation Measures	Responsible Party
Soils	Tactics involving the use of handtools, which minimize the impacts to soil, would be employed to construct firelines, where appropriate. Fire management personnel would rehabilitate firelines after completing the operation to reduce soil loss through erosion.	Park
Air Quality	<p>Several methods are available to reduce the impacts to air quality including, (1) minimizing the area burned, and (2) reducing the fuel loading in the area to be burned through mechanical pretreatment.</p> <p>Burning of slash piles would not be conducted under conditions where ambient levels of ozone are already determined to be unhealthy. Prescriptive elements in prescribed burn plans would specify the proper conditions necessary to increase smoke dispersal and enhance burning, thereby reducing impacts from smoke.</p> <p>Under the Clean Air Act, the Park Service is responsible for protecting air quality within park boundaries. The Park Service must also take appropriate action to do so, when reviewing emission sources both within and in proximity to the monument (Malkin 1994, Clean Air Act, as amended). Therefore, all slash pile burning would be conducted in accordance with regulations established by the State of California and the Clean Air Act and the</p>	Park

Impact Topic	Mitigation Measures	Responsible Party
	Smoke Management Plan.	
Water Quality	<p>In addition to the measures identified in the soils section, whenever possible, vegetation adjacent to streams and other water courses would be protected. The vegetation should sufficiently slow the flow of any run-off to permit debris and soil to be deposited before it could reach a stream or river. Activities would be coordinated with neighboring landowners and agencies.</p> <p>Chemical fire retardant would be used sparingly and with maximum regard for aquatic life. Retardant use is highly discouraged near all streams. The potential area of spread for the fire would be analyzed by Resource Management staff and recommendations made for which streams may be impacted if tactically required to cross any stream with retardants. The Resource Advisor assigned to the fire will be consulted about the use of fire retardant within the park. This consultation would occur on a daily basis to stay abreast of fire spread and potential impacts. Despite this stipulation, there is recognition that retardant and/or foam may be released into tributary streams during fire suppression, especially on large fires.</p>	Park
Vegetation	Fire is not a natural ecological process on Guam and contributes to long-term ecological changes. No prescribed burning will be conducted in the park except under special circumstances (slash pile burning, some research). Vegetation will be rehabilitated following burns.	Park
Wildlife	<p>Burns will be extinguished or confined, depending on the FMU designation, reducing the risk to wildlife.</p> <p>Decisions to confine or extinguish burns in Wildland FMUs will consider the presence/absence of wildlife in the affected area.</p>	Park
Special Status Species	<p>Known locations of sensitive species would be considered during wildland fire suppression operations.</p> <p>At present, the park has no federally listed Threatened and Endangered species or designated critical habitat.</p>	Park
Invasive Non-native Plants	There is a risk that fire will cause the establishment and spread of invasive plants. Suppression actions will be followed by burned area rehabilitation that will attempt to reduce the presence and spread of invasive species in	Park

Impact Topic	Mitigation Measures	Responsible Party
	post-burn community. Special focus will need to be placed on fire promoting grasses such as Caucasian bluestem (<i>Dicanthium bladhi</i>) and mission grass (<i>Pennisetum polystachion</i>). At present the park does not have adequate information on how to conduct these activities but is investigating rehabilitation alternatives.	
Wilderness	The park has no designated wilderness.	Park
Scenery and Recreation	When, during wildland fire suppression operations, administrative closure of an area is necessary to provide for visitor protection, all affected trailheads would be signed so that closures would be easily recognized. Safety measures to ensure visitor safety include posting traffic warning signs and public notices as appropriate. Interpretative programs would be presented, when appropriate, to better inform the public of the role of fire in Guam’s ecosystem. The park would work with adjacent landowners and the Guam Division of Forestry to coordinate activities so that the visiting public would be impacted as little as possible.	Park
Gateway Communities	The park does not have a gateway community.	park

WHY THE SELECTED ACTION WOULD NOT HAVE A SIGNIFICANT EFFECT

As defined by 40CFR1508.27, significant effects on the quality of the human environment is determined by consideration the following criteria:

Impacts That May be Both Beneficial and Adverse

No major adverse or beneficial impacts were identified that would require analysis in an environmental impact statement. The selected plan (preferred alternative) will have no, negligible or minor impacts on air quality, scenery and recreation, gateway communities, natural soundscapes, cultural resources, geology, cultural landscapes, historic structures and districts, ethnographic resources, sacred sites, Indian trust resources, museum objects, socioeconomic resources, prime and unique farmland, land use, environmental justice, wild and scenic rivers and night skies.

Degree of Effect on Public Health or Safety

Human health standards (National Ambient Air Quality Standards for particulate matter size class of 10 microns in diameter and smaller and particulate matter of 2.5 microns in diameter and smaller) could be approached for short periods in the area immediately adjacent to the fire. These effects would generally last less than a week, depending on the size of the fire, the fuels, and the environmental conditions present.

There were no negative effects on public safety identified during preparation of the environmental assessment or agency consultation.

Unique Characteristics of the Geographic Area such as Proximity to Historic or Cultural Resources, Park Lands, Prime Farmlands, Wetlands, Wild and Scenic Rivers, or Ecologically Critical Areas

As described in the environmental assessment, ecologically critical areas, threatened and endangered species, wetlands, floodplains, wild and scenic rivers, and prime and unique farmlands will not be affected.

There are few known and documented archeological resources (which include historic WWII structures) in the project area. The landscape along Asan and Agat beach is of historical significance. As described in the environmental assessment, these resources will not be affected by the preferred alternative. There are no ethnographic, listed or eligible historic districts, or Indian trust resources proximate to the project area; therefore, no impacts to these resources are anticipated.

Whether the Action is Related to Other Actions with Individually Insignificant but Cumulatively Significant Impacts

Impacts to soils, air quality, water quality, vegetation, fire regime, wildlife, special status species, invasive non-native plants, wilderness resources, scenery and recreation, and gateway communities were analyzed in the environmental consequences section of the environmental assessment.

As described in the environmental assessment, cumulative impacts were determined by combining the impacts of the selected action (preferred alternative) with other past, present, and reasonably foreseeable future actions. The short-term and long-term impacts of the selected action (preferred alternative), combined with impacts of past, present, and reasonably foreseeable actions, could result direct and beneficial impacts to soils, air quality, water quality, vegetation, fire regime, wildlife, special status species, invasive non-native plants, and scenery and recreation.

Degree to Which the Action May Adversely Affect an Endangered or Threatened Species or Its Critical Habitat

The selected action (preferred alternative) will not affect endangered or threatened species or critical habitat potentially occurring in or near the project area. No federally listed threatened and endangered species exist with the project area.

Degree to which foreseeable effects on the quality of the human environment are likely to be highly controversial; Possibility that effects on the quality of the human environment may be highly uncertain or involve unique or unknown risks; Prospect for establishing a precedent for future actions with significant effects or representing a decision in principle about any future consideration; and whether the action may violate Federal, State, or Local environmental protection laws

There were no highly controversial effects identified during early scoping, preparation of the environmental assessment, or agency consultations. There were no highly uncertain, unique, or unknown risks identified during preparation of the environmental assessment or agency consultation. The selected actions would neither establish an NPS precedent for any future actions with significant effects, nor does it represent a decision in principle about any future considerations. Finally, implementing the selected actions will violate no federal, state, or local environmental protection laws.

IMPAIRMENT OF PARK RESOURCES OR VALUES

The implementation of the selected plan will not constitute an impairment of park resources or values. Impacts documented in the environmental assessment and summarized above will not affect resources or values key to the natural and cultural integrity of the park or alter opportunities for the enjoyment of the park. The selected action will not impair park resources and will not violate the National Park Service Organic Act. This conclusion is based on a thorough analysis of the impacts described in the environmental assessment, the lack of agency and public comments received, and the professional judgment of the decision-maker, in accordance with National Park Service Management Policies, 2001. As described in the environmental assessment, implementation of the selected action (preferred alternative) will not result in major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of WAPA; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant National Park Service planning documents.

PUBLIC INVOLVEMENT AND AGENCY CONSULTATION

Internal consultation with other agencies, fire management and resources specialists began in December of 2003. Direct scoping meetings were held with interested parties during this time. When this was not possible, the potentially interested parties were contacted by telephone or e-mail to make them aware of the EA/FMP preparation and solicit their input. Scoping meetings

were conducted with U.S. Fish and Wildlife Service, Guam Department of Agriculture, including the Guam Division Forestry and Guam Division of Aquatic and Wildlife Resources, Guam EPA, Guam Fire Department, and the Mayor's Office for the Villages of Agat and Asan. No general public responded to the initial scoping meetings, but comments from the Mayor's Office would incorporate public comments. On Guam, public comment is conducted primarily through the mayoral offices.

A press release went out in November 2004 notifying the public that a fire and fuels management plan and accompanying environmental assessment for War in the Pacific NHP were being drafted. The press release was faxed to 22 cooperators, organizations, and media outlets. The public was notified via the Pacific Daily News, the primary newspaper on Guam, and copies were made available for public review at the park headquarters. Copies of the Environmental Assessment and Fire Management Plan were delivered to the Mayor's Office for the villages of Asan and Piti. The Environmental Assessment and Fire Management Plan were posted on the park's website for public download. A total of 30 hard copies were distributed by the park (Because of the manner in which these documents were made available to the public, the exact number of distributed copies is unknown). Public review lasted 30 days (Nov 22, 2004 through Dec 22, 2004), and no public comments were received.

Compliance with section 106 of the National Historic Preservation Act was completed through consultation with the Guam Historic Preservation Office. The NPS determined that the project will have no adverse effect on identified historic resources. The Territorial Historic Preservation Office was sent an initial scoping letter on April 30th 2004, and was a copy of the environmental assessment in November 2004. A response, dated June 24, 2004, was received from the HPO with limited comments, primarily noting that historic artifacts and sites were not well documented in the park (area of affect). The Fire Management Plan acknowledges the poor state of the park's historical inventory and has incorporated this lack of knowledge into the overall plan in order to best protect these sites.

Compliance with section 7(c) of the Endangered Species Act of 1973, as amended, was completed through informal consultation with the U.S. Fish and Wildlife Service. On June 4, 2003, U.S. Fish and Wildlife Service completed an informal consultation for an environmental screening for another park-related project. At that time, the agency notified the park that further screenings were not necessary, as no endangered species reside in the park or near park boundary. The NPS determined that the project will have no effect on any federally listed endangered or threatened species. The U.S. Fish and Wildlife Service was sent a copy of the initial scoping letter on April 30, 2004, and an copy of the environmental assessment in November 2004. No additional comments were received from the U.S. Fish and Wildlife Service.

CONCLUSION

Based on the analysis documented in the Environmental Assessment (EA), the capability of mitigation measures to minimize potential impacts, and with due consideration for the minimal public concerns and agency consults completed, the NPS has determined that the actions

FINDING OF NO SIGNIFICANT IMPACT

encompassed in the selected plan (preferred alternative as described in the EA) will not have a significant effect on the quality of the human environment. Negative environmental impacts that could occur are considered negligible to moderate in intensity. As noted, mitigation measures were incorporated into the proposed plan so as to avoid, reduce or eliminate impacts.

There are no foreseen significant adverse impacts on public health, public safety, threatened or endangered species, historic properties, either listed in or eligible for listing in the NRHP, or other unique characteristics of the park. No highly uncertain or controversial impacts, unique or unknown risks, significant cumulative effects, or elements of precedence were identified. Implementation of the selected plan will not violate any federal, state, or local environmental protection law, nor will it cause impairment of WAPA resources or values.

Based on the foregoing, it has been determined that an environmental impact statement is not required for this project, and the selected plan will be implemented as soon as practicable.

Recommended:


Eric Brunnenman, Superintendent, WAPA 09. 15. 05
Date

Approved:


Jonathan B. Jarvis, Regional Director 10/3/05
Date
National Park Service, Pacific West Region



ENVIRONMENTAL ASSESSMENT

**Fire Management Plan
War in the Pacific
National Historical Park**



March 1, 2006



HIES

**HAWAI'I INTERNATIONAL ENVIRONMENTAL
SERVICES, INC.**

Earth Scientists and Environmental Engineers

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APPENDICES

<u>Appendix</u>	<u>Title</u>
A	Photographic Documentation
B	Example Notification Letter and List of Recipients

LIST OF ACRONYMS

amsl	above mean sea level
bgs	below ground surface
BMPs	Best Management Practices
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIA	Central Intelligence Agency
CO	Carbon Monoxide
CSIRO	Commonwealth Scientific and Industrial Research Organization
CZMA	Coastal Zone Management Act
DO	Director's Order
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FMP	Fire Management Plan
FMU	Fire Management Unit
FONSI	Finding of No Significant Impact
GMP	General Management Plan
GSA	General Services Administration
HIES	Hawaii International Environmental Services, Inc.
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
mgd	million gallons per day
MOU	Memorandum of Understanding
NO ₂	Nitrogen Dioxide
O ₂	Ozone
Pb	Lead
RMP	Resource Management Plan
SO ₂	Sulfur Dioxide
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WAPA	War in the Pacific National Historical Park
WWII	World War II

SECTION 1 – INTRODUCTION

This report describes the Environmental Assessment [EA] completed by Hawai'i International Environmental Services, Inc. [HIES], of fire management alternatives at War in the Pacific National Historical Park. It has been prepared for the National Park Service [NPS] according to the requirements of the National Environmental Policy Act of 1969 [NEPA], the Council on Environmental Quality's regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508) and NPS Director's Order 12, Conservation Planning, Environmental Impact Analysis and Decision Making. The project was carried out under General Services Administration Contract GS 10F-0132L.

SECTION 2 – PURPOSE AND NEED FOR ACTION

2.1 BACKGROUND

War in the Pacific National Historical Park [WAPA] is located in Guam, a U.S. flag Territory located 3,800 miles west of Hawaii (Figures 1 through 3). The park was established in 1978 “to commemorate the bravery and sacrifice of those participating in the Pacific Theater of World War II and to conserve and interpret outstanding natural, scenic, and historic values and objects on the island of Guam for the benefit and enjoyment of present and future generations” (§6 of Public Law 95-348, August 1978). The park includes 934 acres of land and 1002 acres of water in seven separate units, all located in the west central portion of Guam.

One of the most strategically important U.S. possessions in the Pacific, Guam played a dramatic role in World War II. In 1941, Japanese planes attacked the island within hours of the raid on Pearl Harbor. Guam surrendered two days later, becoming the first U.S. territory to be occupied by Japan. The Japanese occupied the island until July 1944, when American forces invaded and recaptured the island. Each unit of the park contains specific resources related to World War II in the Pacific. The significance of these resources lays both in their roles in the battle for the recapture of Guam, and in the physical remains of structures and equipment they contain. The units are:

- The **Asan Beach Unit**, which is comprised of 109 land acres and 445 acres of water; it is the site of the northern landing beaches, where the American forces came ashore in 1944. Historic features include gun emplacements, caves, pillboxes and other features associated with Japanese defensive positions. In addition, the remains of some pieces of American equipment (landing craft, ordnance, etc.) lie underwater in the offshore area. A number of monuments and historical plaques are also located in this unit. (Appendix A, Plates 1 through 4)
- The **Asan Inland Unit**, this entire inland unit was a major battlefield during the 1944 combat to recapture Guam. Although physical remains such as gun emplacements, pillboxes and foxholes are also present in this unit, its most important feature is its primitive state; historic features lie under thick jungle growth or savanna grasses on terrain that has changed little since WWII. A large memorial is located at the top of the unit, on Nimitz Hill. Taking this high ground, which was held by the Japanese defenders, was the objective of those troops that landed at Asan Beach. It offers a panoramic view of the Asan landing beach and the Asan battlefield directly below. (Appendix A, Plates 4 through 6).

- The **Fonte Plateau Unit** is also located on Nimitz Hill, near the U.S. Navy’s Operations Headquarters. In addition to being the site of the Japanese naval communications center and field hospital, this unit includes the command post of General Takashina, commander of the Japanese forces. Mangan Quarry, a prewar stone quarry used by the Japanese as a defensive position, is located adjacent to this unit. An excellent example of the native limestone forest borders the quarry (Appendix A, Plates 7 through 10).
- The **Piti Guns Unit** includes three, 5.2-inch Vickers-type, Japanese coastal defense guns that are in good condition. The guns sit in a wooded area overlooking the coast. The area includes a picturesque mahogany grove, which also has historical significance (Appendix A, Plates 11 and 12).
- The **Mount Tenjo-Mount Chachao Unit** is located in a remote area. Although few historic remains are left in the area it provides significant overlooks towards Agat and Apra Harbor that underlie its defensive significance during the battle for Guam (Appendix A, Plates 13 through 15).
- The **Agat Unit** is a narrow coastal strip below Mount Alifan that contains caves, bunkers and defensive gun emplacements, all in excellent condition. The Agat Beachhead at Gaan Point is the site of the southern American landing beach. The beach and the offshore areas are relatively unspoiled and provide a good representation of how they appeared in 1944. Like Asan Beach, Agat includes an offshore area. Along this reef pieces of equipment associated with the American landing lie underwater (Appendix A, Plates 16 through 19).
- **The Mount Alifan Unit** contains the largest number of features in the park. The rolling hills of this unit, which sits above the Agat landing beaches, saw some of the most intense battles of the Guam campaign between the Japanese defenders and U.S. Marine and Army units. Caves, tunnels, foxholes, gun emplacements, trenches and bomb craters dot the terrain. However, this area is undeveloped and access is difficult (Appendix A, Plate 20).

A primary objective of those tasked with management of the park is to preserve the important natural and historical features present in the park units detailed above. One of the challenges to this objective is wildland fire. Wildland fires are an unnatural, yet common, event within the park and may be adversely affecting the terrestrial natural resources, many of which occur nowhere else in the National Park System.

NPS Director’s Order # 18 (Wildfire Management) requires that “All National Park Service units with vegetation that can sustain fire must have a Fire Management Plan.” The Order further

states that, “The overall resource management objectives will determine how fire will be managed.” WAPA has never had an approved site-specific Fire Management Plan that meets NPS guidance and fire-related activities that currently take place at the park are not defined within any specific park plan. The NPS proposes to develop a new Fire Management Plan for WAPA. The plan will provide management direction related to wildfires within park boundaries that will support the accomplishment of resource management and protection objectives.

To ensure that procedures described in the Fire Management Plan [FMP] will not have adverse effects on natural and cultural resources, NPS Director’s Order [DO] #18 requires that the FMP be compliant with NEPA. This Environmental Assessment, which has been prepared in accordance with NEPA requirements, presents the fire management alternatives considered for WAPA and an evaluation of the potential impacts of those alternatives. It is also intended to facilitate sound decision making by WAPA management based on the current and best understanding of direct and indirect consequences of fire on the park’s resources; and also, through public participation and inter-agency coordination to determine if an Environmental Impact Statement [EIS] is required.

2.2 PURPOSE AND NEED

WAPA is in need of a new Fire Management Plan. Wildland fires are a frequent event in WAPA, particularly during the dry season, and burn as much as 20% of the park’s land each year. Most fires are attributed to arson; natural fires are extremely rare on Guam as few natural ignition sources are present and the climatic conditions are not conducive to spontaneous ignition. The need for a new FMP is based not only on policy (e.g. NPS DO #18) but also on scientific studies and on-going monitoring that are contributing to a growing understanding of adverse ecological trends within the park units that are caused by wildfires. WAPA managers are becoming increasingly concerned about the health of both the terrestrial and marine natural resources of the park. Vegetation communities within certain areas of the park are poorly adapted to repeated burning, and may be experiencing adverse impacts from the recurring fires. Fires also contribute to upland erosion and coastal runoff. High sediment loads on near-shore coral reefs have also been attributed to upland burning.

SECTION 3 – ALTERNATIVE ANALYSIS

Data from the Guam Department of Forestry illustrates the magnitude of the fire problem on Guam. In the years between 1983 and 1990 more than 80,000 acres were burned in wildfires. In 1998, after a number of wet years with accelerated growth of vegetation, and an especially dry season related to an El Niño (a change in the ocean-atmosphere system that brings drought in the western Pacific), more than 1,200 fires burned 13,000 acres on Guam (Pacific Daily News, May 1998; Guam Department of Agriculture, 2000).

Although scientific evidence indicates that fires have been a part of Guam's environment for many hundreds of years they were not initially a part of the natural ecosystem. Guam's ecosystem has however, become a fire-prone ecosystem and is now subject to more frequent fires because of changed natural conditions. Man introduced fire to Guam's environment and man is the primary cause of the wildfires that currently plague the island. None of the natural ignition sources usually attributed to wildland fires are present. There are no large rockfalls that might produce sparks, no snag piles of fallen timber; and, lightning is extremely rare in tropical Guam. Even in the rare cases when lightning occurs, it is not likely to start a fire because of the high moisture content of the local foliage and the high relative humidity. Even the accidental fire caused by a carelessly discarded cigarette is not a likely occurrence. The top humidity range that will support a cigarette fire is estimated to be no more than 30%; (CSIRO, 2003) in Guam the relative humidity rarely drops below 40%.

Historically, fire was used during the Spanish period (1521-1898) for the creation and maintenance of pastureland for livestock use. Today, poachers, hunting wild deer and feral pigs, and betel-nut gatherers who want easy access to harvest sites, along with arsonists who set fires for no apparent reason are responsible for practically all wildfires on Guam (Guam Department of Forestry, 2000). The majority of these fires occur in the savanna grasslands and mountainous areas in the southern portion of the island where the various WAPA units are located. These areas in the south are dominated by bunch-type grasses that are prone to burning in the dry season. Strong trade winds along with steep slopes cause the fires to spread quickly. This repeated burning has had a profound effect on the ecosystem. Fires have contributed to changes in vegetative types, soil organic matter, and wildlife habitat. Decades of burning on the savanna has resulted in severe erosion and leaching of essential nutrients; adjacent ravine forests are disappearing and runoff from denuded hillsides is threatening the nearshore reefs.

The NPS must develop a FMP for WAPA that takes into consideration the history and causes of wildfire on Guam and its potential impact on affected environments and resources. To this end, two alternatives are being considered.

3.1 ALTERNATIVE 1 – NO ACTION

Although “No Action” implies that no action would be taken in the case of a wildfire, this is not the case. Federal policy (NPS DO #18) requires that until a fire management plan is approved park service personnel must aggressively suppress all fires that occur within the park boundaries. Therefore, the No Action alternative would require that all fires be suppressed within park boundaries regardless of ecological concerns, resource management objectives and cost to the NPS. The “aggressive suppression” would be accomplished by means of a dedicated NPS fire suppression organization made up of WAPA staff (WAPA Draft FMP, 1989) and through memorandums of understanding with the Guam Department of Forestry, Guam Fire Department and the U.S. Navy. Currently the WAPA staff does not have fire suppression expertise and in all likelihood will not in the future; therefore, this action is not preferred. Under this alternative no action(s) will be taken to change the current circumstances.

3.2 ALTERNATIVE 2 – FIRE MANAGEMENT UNIT APPROACH

A *Fire Management Unit* [FMU] is any area defined by common management objectives, land features, values to be protected, political boundaries, fuel types, or of special management areas designated by agency authority or congressional action (such as a protected wilderness) and safety concerns (both public and firefighter safety). For the purpose of this EA, each of the seven WAPA units is considered to be a FMU.

This alternative will address fire management in the two types of units that exist in WAPA: 1) urban interface areas; and, 2) wild areas. An *urban interface area* is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels (Glossary of Wildland Fire Terminology, Department of Interior, 1996). The Asan Inland Unit would be an example of an urban interface area. The Mount Tenjo Unit, which has little to no urban interface, would be a representative example of a *wild area*.

Under this alternative, fire management strategies of appropriate suppression response along with mechanical fuel treatments will be detailed in the Fire Management Plan. Resource benefits would be considered for each park unit and the particular mix of strategies implemented based on specific ecological or park needs. Strategies would include: suppression as required, along with the development of natural fire breaks with appropriate plant species, mechanical and hand clearing to reduce fuel build-up; and, prescribed *pile burning* of removed materials. Pile burning refers to any burning where the debris is piled up and burned on the ground

This is the preferred approach to fire management in WAPA. This approach meets the requirements of DO#18, which also states that, “The overall resource management objectives for

an NPS unit must guide Fire Management Plans”. This alternative is also preferred because it can be implemented with available assets. For example, this alternative does not require a dedicated NPS fire suppression team. When suppression is required, appropriate professional firefighters (Guam Department of Forestry, Guam Fire Department, etc.) would respond. These professional firefighters would also oversee any necessary pile burning. Under this proposed alternative NPS personnel would take on a liaison role, to assure that the vegetative scene is not compromised, and that park artifacts and cultural resources are protected; however, they would not be actively engaged in firefighting or pile burning activities. Although manpower does not differ greatly under the two alternatives, the roles are more clearly defined and the firefighting is left to those specifically trained to suppress fires. The NPS staff, acting in a liaison role, can direct responders when, for example, vital cultural artifacts or landscapes are threatened.

3.3 ALTERNATIVES CONSIDERED BUT REJECTED

Wildland fire use (formerly referred to as *prescribed natural fire*) refers to the management of naturally ignited wildland fire to accomplish specific pre-stated objectives. For example, in the past if a fire started naturally within the boundaries of a park managed by the NPS it might be allowed to burn, albeit with control, to reduce fuel buildup. The term “control” in this sense is defined as a suppression strategy that allows a fire to burn as long as it remains, or is predicted to remain, within predetermined natural boundaries until it is out. This alternative was rejected because of the small size of the park, the many urban interface areas, and the potential impact on lands outside of the park if control was lost.

Another alternative considered but rejected was the use of *prescribed fires* other than prescribed pile burning. Prescribed burning is defined as fire applied in a knowledgeable manner to forest fuels on a specific land area under selected weather conditions to accomplish predetermined, well-defined management objectives (USDA, 1995). This alternative was rejected for three reasons. First, because fire is not a part of the natural ecosystem NPS staff did not want to introduce it into the park. It was also rejected because of the risks associated with controlling fires around the many urban interface areas and the potential damage to park artifacts. Finally, it was rejected because the repetitive fires that are already occurring may be responsible for the development of badlands and the disappearance of certain naturally occurring species; adding additional fires to the system was considered to be counterproductive.

3.4 Environmentally Preferred Alternative

An alternative that is environmentally preferable is defined as “the alternative that will promote the national environmental policy as expressed in the National Environmental Policy Act’s §101. Ordinarily, this means the alternative that causes the least damage to the biological and physical

environment; it also means the alternative that best protects, preserves, and enhances historic, cultural and natural resources” (CEQ 1978).

Based on the limited environmental data available at the time this report was prepared, the environmentally preferred alternative is alternative #2; the fire management approach. It is proposed that this alternative will have no major impact on geology and soils, biological resources, air quality and socioeconomic issues. There would be negligible to moderate, long-term beneficial effects on vegetation and wildlife; the proposed action is not believed to affect listed threatened and endangered species. It is believed that this approach will have a positive impact on the cultural resources of WAPA by preserving in an interpretative form the landscape as it was in 1944. It allows flexibility in approach to fires within the park, and it is also believed it will promote cooperative relationships with other agencies involved with wildland fire issues and response.

In addition, alternative #2 is also a “reasonable alternative” NEPA defines reasonable alternatives as those that are economically and technically feasible and that show evidence of common sense. In addition to the resource issues noted in 3.1, the No Action alternative does not meet another important objective; interagency coordination with the Guam Department of Forestry, the Guam Fire Department and the U.S. Navy which are tasked with the stewardship of lands adjacent to the park.

This EA provides a programmatic (general) analysis of resources within the park and the potential impact(s) to those resources under the alternatives being considered. It does not provide an exhaustive environmental impact analysis of each resource, this more in-depth analysis will be developed over time as detailed resource surveys for WAPA are completed and other management documents are prepared.

Table 3.1
Summary of Alternatives
Environmental Assessment
War in the Pacific National Historical Park

DESCRIPTION	NO ACTION	PROPOSED ACTION
Description of Alternative	All wildfires will be aggressively suppressed (control response only) regardless of location within park, using a combination of a dedicated NPS suppression team along with responders from other agencies under Memorandums of Understanding [MOU].	Development of a Fire Management Plan that recognizes each park unit as a unique Fire Management Unit. Strategies of appropriate suppression and response along with mechanical fuel treatments would be developed. Resource benefits would be considered for each park unit and the particular mix of strategies implemented based on specific ecological or park needs.
POTENTIAL IMPACTS		
Geology and Soils	Short to long term, moderate to severe, impact to soils from both fire and impacts from machinery removing vegetative cover for firebreaks. Possible direct and indirect impacts and both long and short-term impact to vegetative cover.	Short-term effects negligible, long- term effects moderate, direct and localized.
Biological Resources	Some threat to fire resistant/fire dependent plant species. Possible change in vegetative patterns. This alternative would have negligible to moderate short and long-term effects on vegetative cover depending on park unit. Short and long-term effects to animals would be direct and moderate	The effect on wildlife would be the same as the No Action alternative. Negligible short-term effects on plants with direct, positive, effects in the long-term.

Table 3.1 (Continued)
Summary of Alternatives
Environmental Assessment
War in the Pacific National Historical Park

DESCRIPTION	NO ACTION	PROPOSED ACTION
Water Resources	Negligible short-term impacts to water and aquatic resources. Long-term effects would be localized, the impact minor to moderate.	Negligible short-term impacts to water and aquatic resources. Long-term effects would be localized, the impact minor to moderate.
Air Quality	Short-term effects on air quality would be adverse, moderate and direct. Long-term effects would be negligible.	Same as No Action Alternative. Prescribed pile burns would be scheduled using best management practices to assure air quality was not effected locally.
Socioeconomic and Safety	Short-term effects would be direct, beneficial and minor. Long-term effects would be minor and beneficial.	This alternative is anticipated to have beneficial, direct, indirect and long-term effects on the human environment.
Cultural Resources	Short-term effects would be direct and localized, although in most cases minor. Fire suppression may threaten certain artifacts and the interpretative setting because of machinery in response and to clear firebreaks	Short-term effects would be minor, direct and localized. Decisions as to whether to suppress or not suppress a fire would be made with the specific unit and its unique resources in mind.
Land Use	Short and long-term impacts would be direct and minor.	Overall short and long-term impacts to land use would be negligible.

SECTION 4 – AFFECTED ENVIRONMENTS, IMPACTS AND MITIGATION

This section will present a brief background of the environment, resources that are present, and an analysis of potential impacts to each resource. The resources considered include geology and soils, biological resources; water resources; air quality; socioeconomic and public safety; cultural resources and land use. No other resource areas have been identified that would require further evaluation pursuant to NEPA.

4.1 IMPACT ASSESSMENT METHODOLOGY / IMPAIRMENT ANALYSIS

The general methodology used to determine environmental consequences or potential impacts to cultural, natural and human environments included consultation with other agencies and interested stakeholders and literature review. Stakeholders, for the purpose of this document, are those persons that are responsible for adjacent lands, agencies that are responsible for the stewardship of lands or cultural and biological resources and park staff. Also considered was “common knowledge” often anecdotal but valuable. This includes the knowledge of those people working at local agencies tasked with firefighting (such as the Guam Department of Forestry). As to literature review, documents such as the Territory’s Fire Management Plan and Fire Department policies were considered along with the, in some cases, limited data regarding environmental, biological and cultural resources.

NPS management policies require an analysis of potential effects to determine whether or not actions would impair park resources or values (impairment analysis).

The fundamental purpose of the NPS, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or minimize to the greatest degree practicable, actions that would adversely affect park resources and values.

These laws give the NPS the management discretion to allow certain impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute “impairment” of the affected resources and values. Although Congress has given the NPS management discretion, allowing certain impacts, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that, in the professional judgment of NPS personnel would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute an impairment. Impairment may result from NPS activities in managing the park, activities by concessionaires, contractors or other agencies operating in the park. An impact would be more likely to constitute an impairment to the extent it has a major or severe adverse effect upon a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park.
- Key to the natural or cultural integrity of the park or to opportunities for the enjoyment of the park.
- Identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

Impacts to specific resources in the following sections are described in general terms and are qualified as short-term and long-term, adverse or beneficial as appropriate. A determination on impairment is also included in each of the following topics.

4.2 GEOLOGY AND SOILS

The Mariana Islands are a classic example of an island arc, a curved line of stratovolcanoes that rise up from the ocean floor. These stratovolcanoes, and the islands they form, owe their origin to subduction, the tectonic process that thrusts one plate beneath another. It is just to the east of the Mariana Islands, along the Marianas Trench, where the Philippine Plate subducts the Pacific Plate. The Marianas Trench, which is the result of the convergence of these two plates, is the deepest point on the earth's surface (37,898 ft.); it lies 210 miles east of the largest of the 15 Mariana Islands, Guam.

Guam, located at 13° 30' north latitude and 144° 40' east longitude, is the southernmost island of the Mariana Islands Archipelago and has an area of 212 square miles. The island was formed by severe land movement and volcanic action during the Tertiary and Quaternary periods, and contains two distinct geologic formations. The northern half of Guam is an upthrust Neogene limestone plateau that, for the most part, ranges from 100 to 600 feet above mean sea level [amsl] in elevation. Although some springs are found within the plateau there are no streams. Geologic characteristics within this half of the island include steep cliffs along the shoreline;

inland, the plateau contains very permeable substrata with ill-defined watershed boundaries and drainage ways, and is marked with depressions and sinkholes (Samowitz, and Forsyth, 1981).

The southern half of the island, formed by volcanic eruptions, consists of low mountain ridges and valleys that are typically small in size with steep stream slopes. The slopes are deeply dissected by numerous rivers. These rivers coalesce to form relatively wide valley bottoms near the coast and several narrow coastal plains. A relatively impermeable rock formation, comprised of basalt, underlies most of the southern half although limestone is present along the southeastern coast and in large areas around Mount Lamlam and Mount Alifan (Young, 1988). Elevations on the southern half of the island range from sea level to 1,332 feet at Mount Lamlam, the highest point on Guam.

As Guam has undergone several periods of subsidence and uplift, its basal volcanic materials have become interbedded with, and often covered by, limestones of reef origin. Major geologic rock units within the park include:

- The *Alutom formation* which consists of well-bedded fine to coarse-grained gray, green and brown tuffaceous shale and sandstone; lenses of fine to coarse-grained, tuffaceous foraminiferal limestone; pyroclastic conglomerate containing limestone fragments; and interbedded lava flows. Maximum thickness exceeds 2000 feet. Alutom is considered to be bedrock. This formation underlies most of the inland units.
- *Mariana Limestone*, a massive, porous, fossiliferous, rock. This limestone lies in either faulted or unconformable sedimentary contact with weathered volcanics and older limestones.
- *Alifan Limestone*, a dense hard limestone, which unlike the *Mariana Limestone* is highly permeable. (WAPA RMP, 1988; Gov Guam/GIS, 2003; Tracey J.I. et.al. 1964).

Because the park units are spread over a wide area, there are a number of soil types from several different associations. Generally speaking, soils in the various park units include:

Soils on bottom lands, such as the *Inarajan-Inarajan Variant*. These are deep and very deep, somewhat poorly drained and poorly drained, level and nearly level soils formed on valley bottoms and coastal plains.

Soils on volcanic uplands, including *Akina-Agfayan* and *Akina-Togcha-Ylig* soils. *Akina-Agfayan* soils are very shallow, to very deep, well drained, and moderately steep, to very steep soils; these soils are located on strongly dissected mountains and plateaus. *Akina Togcha-Ylig* soils are very

deep, somewhat poorly drained and well drained, gently sloping to strongly sloping soils; these soils are found on plateaus and in basins.

Soils on limestone uplands, include *Guam*, which are very shallow, well drained, and nearly level, to moderately sloping soils that are found on plateaus. *Guam-Urban Land Pulantat*, which are very shallow, well drained, level to gently sloping soils, and urban land; found on plateaus. *Ritidian-Rock Outcrop-Guam*, which is very shallow, well drained, gently sloping to extremely steep soil, and rock outcrop; these soils are found on plateaus, mountains and escarpments. *Pulantat*, shallow and well drained, gently sloping to steep soils; found on dissected plateaus and hills. *Pulantat-Kagman-Chacha*, are shallow, deep, and very deep, somewhat poorly drained and well-drained, nearly level to strongly sloping soils that are found on plateaus and hills (Young, 1988).

Specific soil types found within the various WAPA units include:

- *Agfayan-Akina, extremely steep.*
- *Agfayan-Akina Rock Outcrop, extremely steep.*
- *Akina Badland Complex,*
- *Inrajan Clay 0-4% slopes.*
- *Inrajan sandy clay loam 0-3% slopes.*
- *Pulantat Clay 7-15% slopes and 30-60% slopes.*
- *Pulantat Urban Land Complex, 7-15% slopes.*
- *Ritidian Rock Outcrop Complex, 15 to 60% slopes.*
- *Urban land-Ustorthents Complex, nearly level.*
- *Shioya Loamy Sand, 0 to 5% slopes (Young, 1988)*

Table 4-1 presents which of the specific soil types listed above are found within each park unit.

Table 4.1
Soil Types by Unit
Environmental Assessment
War in the Pacific National Historical Park

Soil Type	Asan Beach Unit	Asan Inland Unit	Piti Guns Unit	Fonte Plateau Unit	Agat/Apaca Unit	Tenjo/Chachao Unit	Mt. Alifan Unit
Agpayan-Akina Extremely Steep		X					
Aagfayan-Akina-Rock Outcrop Extremely Steep		X				X	
Akina Badland Complex 7-15% Slope		X				X	
Akina Badland Complex Extremely Steep		X		X		X	
Inarajan Clay 0-4% Slopes	X	X	X				
Inrajan Sandy Clay Loam 7-15% Slopes					X		
Pulantat Clay 3-7% Slopes		X	X		X		
Pulantat Clay 30-60% Slopes		X		X			
Pulantat Urban land Complex 7-15% Slopes		X		X			
Ritidian Rock Outcrop Complex 15-60% Slope	X						X
Shioya Loamy Sand (flat)					X		
Urban Land, Ustorthents Complex	X						

4.2.1 Alternative 1 – No Action

The No Action Alternative, which calls for full suppression, would have little impact on geological resources within the park. However, soils could be impacted by heavy machinery used to cut firebreaks or to build access roads to remote fire areas. Soils in those areas where vegetative cover is removed for firebreaks or access would be exposed to erosion forces, water used in suppression might also increase soil loss. Short-term (recovers in less than 3-years from fire) effects to soils under this alternative would be adverse but moderate (moderate meaning the effects on soil productivity, fertility, stability or infiltration capacity would be readily apparent and result in a change to the soil character over a relatively wide area). Long-term (takes more than 3-years to recover) effects to soils would also be adverse and possibly severe (severe meaning the effect on soil productivity, fertility, stability, or infiltration capacity would have a substantial and possibly permanent consequence) as long-term aggressive suppression might change the overall ecological balance in areas now dominated by fire dependent plant species. As vegetative cover changes, soils may be affected by leaching of essential nutrients or displaced by erosion.

4.2.2 Alternative 2 – Fire Management Unit Approach

The FMU approach will allow decisions to be made with consideration of the resource strategy for each specific unit. In areas where soil erosion is an issue and mechanized response might have a detrimental impact, the development of natural fire breaks and hand clearing might be the preferred response. In other areas where repeated burning has lead to erosion or changes in soil chemistry a more aggressive response might be considered. The FMU approach has the advantage as an alternative in that at least a response decision can be made that takes into account ecological needs such as soil issues in a specific unit. Because the FMU approach allows flexibility, short-term effects would be negligible, long-term effects would likely be moderate, direct and localized. Otherwise, no detrimental impacts or impairment to geology or soils using this alternative have been identified.

4.3 BIOLOGICAL RESOURCES

The climate of Guam is *Tropical Marine*, which is generally warm and humid year-round. The mean annual temperature is 81° Fahrenheit and the relative humidity ranges between 77-81%; this moist climate is moderated somewhat by northeast trade winds (CIA, 2003). Although there is little seasonal temperature variation, there are two primary seasons and two secondary seasons on Guam. The primary seasons are the dry season, which extends from January through April;

and the wet season, which extends from mid-July through December. The secondary seasons extend from May to mid-July and from mid-November through December. These are transitional seasons that can be rainy or dry depending on weather conditions of that particular year (Young, 1988). Annual rainfall on Guam ranges from 80-110 inches.

Vegetation

Most of Guam is covered by secondary growth forest and grasslands; however, scattered patches of possibly original forest still exist on the northern plateau and in less accessible areas in the southern mountains. The southern section of the island is dominated by a patchwork of savannahs, grasslands and ravine forests (Fosberg, 1960). The original forests and plant species have given way to successive waves of migration, cultivation, burning, typhoons, and the destructive effects of World War II.

Limestone forests are found on the northern plateau. Areas of undisturbed irregular canopy reach as high as 25 meters with a sparse understory; however, this understory tends to be dense in disturbed areas. The forest transitions into dense scrub along its margins, along cliff faces and near the ocean. Trees include the *dugdug* (*Autocarpus mariannensis*) a wild breadfruit and *nunu* (*Ficus prolixis*) a large banyan. *Chopak* (*Mammea odorata*), a large tree with a spreading crown and very hard wood is also found in the northern half of the island; it was however decimated by logging, mature stands are rare except along the somewhat inaccessible eastern escarpment.

Ravine forest communities are found along lowlands, valleys, and ravines in the southern half of Guam, primarily on leeward mountainsides. These ravine forests are dominated by palma brava (*Heterospatha elata*); other common trees include coconut palm (*Cocos nucifera*) banana palm (*Musa sp*), pandanus (*Pandanus tectorius*), and hibiscus (*Hibiscus tiliaceus*). These forests also contain lianas (woody vines), and the ubiquitous climbing vine popularly known as the “chain of hearts” (*Antigon leptopus*). Various ferns and orchids are also present in this plant community.

Marshes of fresh to brackish water also exist in the lowland areas of the southern section of the island. Clusters of reeds and rushes such as the bullrush (*Typha latifolia*), and mangrove (*Avicennia marina*), which is designated on Guam as endangered, grow in these low marshy areas; sedges, along with ginger and wild taro are also found in these marshes.

Savanna covers almost all of the southern half of the island. The prominent vegetation is swordgrass (*Miscanthus floridulus*), a tall, coarse, cane-like grass with sharp edges that grows to heights of 6-10 feet. Foxtail (*Pennisetum polystachyon*), and low-tufted grasses such as *Dirneria chiordiformis* are also common. There are also stands of ironwood (*Casuarina equisetifolia*)

scattered throughout the grasslands; ground orchids, such as the worm orchid (*Taeniophyllum mariannese*), various types of ferns, and other small trees and shrubs are also dispersed across the savanna.

One plant that is found in across Guam, appearing in all of the types of areas discussed above, is the tangantangan (*Leucaena leucocephala*). Although tangantagan, a type of legume, existed prior to World War II, it has spread dramatically to become one of the most common plants on the island. At the end of the war the landscape was not recovering, the heavy fighting, drought, and brush fires, left the mountainsides black and led to heavy erosion. To counter this, mass reseeded of tangantangan by hand, mechanical means and aircraft were carried out. Tangantangan was selected for revegetation because it thrives in limestone areas where soils are alkaline, is resistant to most pests and durable under duress from grazing, cutting, fire and drought. Tangantangan grows easily from seeds dispersed by birds and rodents; it regrows from cut stumps, and regenerates rapidly from basal shoots after fire. (PIER, 2003).

All seven WAPA units are located in the southern half of Guam. The savanna ecosystem of grasses, low trees, and shrubs is the predominant feature in the Mount Alifan and Mount Tenjo/Chachao Units; it also occurs on the western slope of the Asan Inland Unit. The Fonte Plateau unit includes both savanna features and limestone forest. A stand of mahogany forest that predates World War II is a significant feature in the Piti Guns Unit. Although the savanna ecosystem appears to resist the growth of tangantangan, this ubiquitous plant is present in virtually all of the park units. A small area near Apaca Point, which is within the Namu River Floodplain, has been classified under the Guam Coastal Management Program as a wetland.

Island systems like Guam, which evolve with a specific habitat, are often completely overwhelmed by imported species. Over the 3,500 years that the island has been inhabited the successive waves of settlers brought their domestic food species and weed species as well. It is difficult to speak in terms of a “native” plant species on Guam, as most plants are introduced. Even the territory’s designated flower, the bougainvillea (*Bougainvillea sp.*), is an introduced species.

Just as introduced species of plants have out-competed local species, introduced animal species have also had a dramatic impact on Guam.

Wildlife

The dominant terrestrial animals on Guam consist of insects and small lizards such as the gecko (*Gekkonidae sp.*), blue-tailed skinks (*Eumecs sp.*), and chameleons (*Chamaleo sp.*). Larger vertebrates include cattle, dogs, cats, pigs, and chickens. Deer (an introduced species) and feral pigs roam widely on the island especially on the plateaus and savannas in the south.

The introduced animal that has had the most impact on Guam is the brown tree snake (*Boiga irregularis*). Before the arrival of this species the only snake present on the island was the burrowing blind snake (*Rhamphotyphlops braminus*). The brown tree snake is responsible for much of the loss of biodiversity through predation. The snake was first reported in the savannas in the south in the 1950's; by the 1970's it had moved northward into the limestone forests. Today the snake is ubiquitous, present in virtually every area of the island. In a report published in 1988 (Fritts, 1988), the tree snake population across the island was estimated to be approximately 13,000 per square mile. During the following decade, the government of Guam and various federal agencies began an aggressive snake control regimen. Although the per-square mile number of the snake has decreased, it is still present in remarkably high numbers across the island. In 2003, an inventory of reptiles within WAPA was performed (Rodda, 2003). According to data published in this study, by 2003, the average snake population on Guam was 7,500 snakes per square mile. Within the areas of the park that were sampled, the snakes were found, in what the report describes as, "low to moderate densities" (2000-5000 per square mile). These astonishing numbers are due to the snake's ability to live in various habitats and its lack of natural predators (U.S. Dept of Interior, Fish and Wildlife Service, 1988).

The most significant impact that the brown tree snake has had on Guam's biodiversity is most evident in the decrease in avifauna. This decline was seen initially in the 1950's, in the savannas where the snake was first reported. By the 1970's extinction of forest birds reached the northern portion of the island, not long after the tree snake had taken up residence. By the 1980's bird populations were completely decimated. Two bird species extinctions had already occurred and the endemic Guam rail (*Gallirallus owstoni*) became extinct in the wild (Rodda, et.al. 1997).

The birds of Guam are not the only fauna affected by the brown tree snake, skinks, geckos and chameleons are becoming scarce because of the predation of the snake. Guam was also once home to three native bat species but since the introduction of the brown tree snake two of the three species have become extinct; only the Marianas fruit bat (*Pteropus marianus*) remains and it is on the endangered species list.

Fringing reefs surround most of the island and are easily accessible from shore; these reefs abound with a diversity of sea life. Two WAPA units, Asan Beach and Agat, have extensive water acreage. This offshore acreage includes coral reefs and associated marine biological resources.

At present, 794 species of inshore marine fishes are known from Guam and nearby waters (Amesbury S.S., et.al. 2001). Two species of sea turtle are found in offshore areas; the Green turtle (*Chelonia mydas*) and the hawksbill turtle (*Eretmochelys imbricata*), both are protected under local and federal endangered species acts.

Development and wildfires have had a noticeable impact on Guam's reefs. Destruction of the reef framework is occurring in many places, with declines in the numbers of plants and animals present on the reefs compared to only a few years ago. Many of these changes are directly related to development. The destruction of habitats that serve to filter sediments from runoff such as mangroves and wetlands and non-point source runoff from urban areas are apparent actors in reef destruction. However, in addition to the obvious impacts caused by human populations and the attendant development, wildfires are also having an impact. As hillsides become denuded, heavy loads of soil are carried into the ocean as runoff. The organisms that build coral reefs generally need clear water and constant salinities; siltation and turbidity from runoff associated with wildfires are having an effect on the nearshore reefs of Guam, including those at Asan and Agat.

4.3.1 Alternative 1 – No Action

Aggressive response under the No Action alternative may actually have a detrimental effect on those areas where fire-resistant/fire dependent species have become established. In the absence of fire, the dominance of swordgrass savanna is threatened. Although swordgrass is considered an exotic, invasive species (Fosberg, 1960, Guam Division of Forestry, 2000) and prone to wildfire, in some areas of the park it is an important part of the historical landscape; a healthy savanna, which includes swordgrass may also prevent the encroachment of post-war, exotic vegetation into the park. The NPS has a long-standing policy within national military parks and national battlefields of restoring or keeping vegetative patterns to the patterns at the time of the battles. This alternative would have negligible to moderate short-term and long-term effects on vegetation depending on the park unit in question. In the case of vegetation, “negligible” changes are those that would not be easily measurable, with no effect on native species populations. In other words, any effects would be small scale and no species of concern would be affected. “moderate” changes in vegetative communities would be readily apparent, with effects to a sizeable segment of the species’ population over a relatively large area.

Short-term effects (recovers in 1-3 years after fire depending on species) to wildlife would be minor and direct. Fire may be either detrimental or beneficial; fire does not affect all species equally. In general, most studies that have been conducted show that wildlife mortality in wildfires on Guam is low. (Whelan, R.J. 1995) In the savannas especially, the population of feral pigs and deer are accustomed to fire and move accordingly; however some mortality associated with fire is possible. Short and long-term effects of fire within the various WAPA units on skinks, geckos, birds and other species would be direct and moderate. A moderate impact would be one that would be detectable; however, species viability and genetic variability would remain stable. Mortality or interference with activities necessary for survival could be expected occasionally without threatening the continued existence of the species in the park. This is assumed because of the short life and reproductive cycles of skinks and other small reptiles; they make those populations somewhat resilient, birds like larger animals, will usually move out of the path of the fire. Although there would be some impact to wildlife under this alternative, it would not constitute an impairment.

4.3.2 Alternative 2 – Fire Management Unit Approach

The FMU approach will allow decisions to be made with consideration of the resource strategy for each specific unit. Confinement or control of fire in some swordgrass communities would be considered under the FMU approach. The nature of swordgrass and the fuel load it carries almost assures that fires will occur. Allowing some fire in selected areas would perpetuate the appearance of swordgrass in many areas where it existed in 1944, enhancing the interpretative landscape. The FMU approach will also allow consideration of other strategies in respect to swordgrass in areas of the park where it is unwanted for interpretive reasons or because of the danger it presents in urban interface areas. In these areas swordgrass might be removed by mechanical clearing and prescribed pile burning followed by planting of natural firebreaks with fire-resistant species.

The effect on wildlife would be the same as the No Action alternative in that there would not be impairment to the park's wildlife resources. The FMU alternative at least allows consideration as to whether a fire should be suppressed or allowed, with control, to burn. The decision would take into account the effect on local wildlife in a specific unit under the full range of options that includes mechanical clearance and pile burning, full suppression or some combination of actions.

4.4 WATER RESOURCES

Guam's hydrology and water resources are influenced primarily by area rainfall and geology. There are no streams on the northern limestone plateau although there are a few springs. Southern Guam has many streams flowing from the complex, highly dissected, interior. Rainfall in Guam averages between 80 and 110-inches a year, most of this falls in the wet season between July and December. Much of the rain infiltrates the permeable limestone substrate in the northern portion of the island where Guam's primary source of drinking water, the Northern Guam Lens Aquifer, is located. The Northern Guam Lens Aquifer is designated a Sole Source Aquifer under the Safe Drinking Water Act. This designation is based upon two criteria: (1) the aquifer supplies drinking water to 50 percent or more of the area's population and; (2) if contaminated, the aquifer would present a significant risk to public health.

According to Guam EPA statistics (Guam EPA, 2003), unprecedented demands are being made on the Island's limited water resources as population grows and tourist attendance rises. Currently, over 45 million gallons per day [mgd] of the current estimated sustainable yield of 57 mgd is extracted from the Northern Guam Lens Aquifer. This over-pumping has led to concerns about saltwater intrusion to this important aquifer. In addition to over-pumping, this drinking water source is threatened by household hazardous waste, stormwater runoff, agricultural activities, and nitrates from septic tanks in new residential growth areas. Outside of the Northern Guam Lens Aquifer, some drinking water is obtained from surface water sources; these include the Fena Reservoir, an impoundment on the Ugum River, and various springs in the southern section of the Island.

4.4.1 Alternative 1 – No Action

Full suppression would have negligible short-term impacts to water and aquatic resources. Long-term effects would be localized, and depending on the location of the stream or water body, the impact would be minor to moderate. For this resource, negligible means changes to water quality would be either non-detectable or, if detected, would have effects that would be considered slight and localized. "Short-term" means that the water resource would recover in less than one month after a fire. A "moderate" impact is one in which changes to water quality would be measurable and apparent, with sufficient consequences to cause concern, although effects would be relatively local and/or easily mitigated.

4.4.2 Alternative 2– Fire Management Unit Approach

Potential impacts under the proposed alternative would be similar to those under the no action alternative. Localized, minor to moderate effects could be expected in both the short and long-

term. However, overall no prohibited impairment to water or aquatic resources is anticipated. The flexibility to choose under the FMU approach would allow wider consideration of alternative response and control strategies.

4.5 AIR QUALITY

In 1990, the U. S. Environmental Protection Agency [EPA] established national ambient air quality standards for six criteria pollutants; nitrogen dioxide [NO₂], ozone [O₃], sulfur dioxide [SO₂], Carbon Monoxide [CO], lead [Pb], and particulate matter less than 10 micrometers in diameter. Areas where the concentration of a specific monitored pollutant exceeds the EPA standards are classified as “nonattainment” for that pollutant. If the monitored concentration is below the standard the area is classified as in “attainment”. Favorable meteorological conditions, in particular the nearly constant northeast trade winds, help keep levels of air pollution on Guam to a minimum. Guam, except for a small area around the island’s major power plant, is classified as being in attainment with air quality standards for the criteria pollutants (EPA, 2003).

4.5.1 Alternative 1 – No Action

Short-term effects on air quality would be adverse, moderate and direct. Moderate impacts are those changes in air quality and air quality-related values that are readily apparent. The effects of smoke to health and visibility would be sufficient to cause concern, although effects would be relatively local and short-term. Short-term means that air quality will recover within seven days or less after a fire. Long-term effects would be negligible. Negligible, as defined for this resource, means that air quality and air quality-related values would be below or at the level of detection. If detected, effects would be considered slight with no perceptible consequences to health or visibility.

4.5.2 Alternative 2 – Fire Management Unit Approach

Effects under the proposed FMU alternative would be the same as the No Action alternative. If prescribed pile burning of removed overgrowth occurred, NPS personnel would plan these burns to coincide with favorable meteorological conditions and employ “Best Management Practices” [BMPs] to assure that the fires were controlled and did not adversely effect the immediate environment. No impairment to air quality is anticipated under either approach.

4.6 SOCIOECONOMIC AND PUBLIC SAFETY

Guam's estimated population in 2003 is 163,941 with a population growth rate of 1.89% (CIA 2003). The reported ethnic composition of the island in 2003 included 37% Chamorro, 22.6% Filipino, 12% Caucasian, and 4.7% Micronesian; the remaining percentage of the population is made up of ethnic Japanese, Korean and Chinese. The median age is 25.2 years and the mean household income is approximately \$44,000. The major sources of income on Guam are industrial 10%, trade 24%, other services (mainly tourism) 40% and territorial and federal government at 26%. The unemployment rate (based on year 2000 estimates) is 15%. It was estimated in 2001 that 23% of the population had an income that placed them below the poverty line. Guam receives large transfer payments from the U.S. Federal Treasury (\$143 million in 1997) into which Guamanians pay no income or excise taxes; under the provisions of a special law enacted by congress, the Guam Treasury, rather than the U.S. Treasury, receives federal income taxes paid by military and civilian federal employees stationed in Guam.

Two Executive Orders [EO] related to social economic impacts and public safety must be considered under the EA process. EO 12898 (Environmental Justice) requires that federal agencies make achieving environmental justice part of their missions by identifying and addressing disproportionately high and adverse human health or environmental effects caused by its programs, policies and activities on minority and low-income populations. EO 12898 also tasks federal agencies with ensuring that public notifications regarding environmental issues are concise, understandable, and readily accessible. EO 12699 (Seismic Safety) requires federal agencies to review projects for impacts to human safety related to building design and construction.

4.6.1 Alternative 1 – No Action

Under this alternative property losses and threats to public safety would be reduced because all fires would be aggressively suppressed. Short-term impacts (effects only during the period of fire) would be direct, beneficial and minor. Long-term impacts (those impacts that continue after the period of the fire) would be minor and beneficial.

4.6.2 Alternative 2 – Fire Management Unit Approach

As in the No Action alternative, threats to property and public safety would also be reduced, under the FMU alternative. Under this alternative, all fires in the urban interface and those that

threaten human safety will be suppressed using a control suppression strategy. Control is defined as a suppression strategy where the most aggressive response tactics are used. This includes the establishment of fire lines around a fire to halt its spread and extinguish all hotspots until it is out. In wild areas a confine or contain strategy might be the most appropriate response. As noted earlier, a “confine” strategy is one that allows a fire to burn as long as it remains, or is predicted to remain within predetermined natural boundaries until it is out. This alternative requires minimal suppression action. It can be used in those FMU units that have extensive natural barriers and low resource values at risk, and under weather conditions that do not offer the potential to cause the fire to move into areas where it is unwanted. A “contain” strategy is a suppression tactic where a fire is restricted to a certain area by using natural barriers or constructed barriers that stop the fire’s spread under prevailing and forecasted weather conditions. This alternative may also be used in selected FMUs. The contain strategy may be used when resource values at risk are not as great as in those areas where a confine strategy might be used; where the fire poses no threat to human life or property; where there is no chance the fire will burn outside the park boundaries because of natural barriers, and, where suppression actions might place firefighters in undue danger. Again, because of flexibility in the FMU approach, fires can function as a part of the eco-system or be suppressed using appropriate confine, contain and control strategies when they threaten public safety, property or important cultural resources.

This preferred alternative is anticipated to have beneficial, direct, indirect, short and long-term effects on the human (socioeconomic) environment and public health and safety. Under this alternative there would be less chance of an extreme wildfire. Economic impacts from extreme wildfires would be mitigated; this would include the direct costs associated with firefighting and indirect cost to the local economy from potential reduction in tourism or recreation revenues. Neither alternative is anticipated to cause an impairment to park resources or values.

In compliance with EO 12898, socioeconomic and demographic data related to residents of Guam were reviewed to determine if a disproportionate number of minority or low-income persons might be affected by the proposed action. Based on the data compiled and summarized in Section 4.5, this alternative will not disproportionately affect minority or low-income persons. Because the proposed action does not involve construction of occupied buildings, it is in compliance with EO 12699.

4.7 CULTURAL RESOURCES

In addition to review under NEPA, the National Historic Preservation Act [NHPA], as amended in 1992 (16 USC et seq.) requires that consideration of impacts on historic structures listed in, or eligible for listing in the National Register of Historic Places be made. Altogether there are 155 sites on Guam that are either on the National Register or the Guam Register of Historic sites. WAPA is listed on the National Register of Historic Places, as are specific areas within the park. These areas include the Agat Invasion Beach, the Asan Invasion Beach, the Asan Inland Unit (sometimes referred to as the Asan Ridge Battlefield), Memorial Beach Park (part of the Asan Beach Unit) and the Piti Guns Unit. In addition, many areas outside of the park have historic sites related to WWII that are also on the National Register of Places. Although a large number of these sites are in urban Agana, or on the northern end of the island, some sites are near WAPA; these nearby sites include a number of historical sites in the Fonte Plateau area, and Hill 40 (near the Agat unit) the site of a particularly bloody encounter between U.S. and Japanese troops. Each unit of the park contains specific resources related to WWII. Their significance lies both in the roles in the battle for Guam and in their contents, physical remains of structures or equipment.

NEPA and NHPA also apply to archeological resources, cultural landscapes and ethnographic resources. As of 2000, 55 terrestrial/archeological sites have been recorded at WAPA (Minton 2004). It has been estimated that there are as many as 42 additional undocumented historical sites within the various units of the park (Siefkin, 2004). In addition, five distinct cultural landscapes have been identified within the park. Although it is not clear whether important ethnographic resources are located within park boundaries, it is possible that certain units include sites that are significant to Chamorro history and culture. The preservation and management of these high-integrity cultural and historic sites is one of primary objectives of NPS management.

The impacts to cultural resources from fire management activities come in three forms: *direct* – alterations to the cultural resource resulting from heat and smoke, *operational* – such as impact from heavy equipment used to fight the fire or the construction of firelines, and *indirect* – changes in local context caused by erosion, vandalism and looting.

4.7.1 Alternative 1 – No Action

Because the No Action alternative calls for full suppression the short-term effects would be both direct and indirect with negligible adverse effects. Negligible is defined as barely measurable

with little perceptible consequences, either adverse or beneficial to archaeological resources. Long-term effects would be minor and beneficial. Although fires do threaten certain cultural sites (foxholes, pillboxes etc.) some opinion has been voiced that as long as the sites are in a “wild” state and inaccessible the cultural scene is actually less compromised, human interaction is discouraged and the sites are less likely to be irreparably damaged by indirect impacts related to vandalism and looting.

4.7.2 Alternative 2 – Fire Management Unit Approach

Under this approach it is believed that short-term effects would be minor, direct and localized. Minor is defined as little, if any, loss of cultural or archaeological significance or integrity and no impact on the eligibility of the site for inclusion on the National Register. Long-term beneficial effects to cultural resources would occur as protection objectives are accomplished. Decisions as to whether a fire would have to be suppressed would be made with the specific unit in mind. NPS personnel would weigh the potential effect of the fire and any operational impacts (heavy equipment, fire line construction etc.) on cultural resources within that unit against other considerations including, biological resource needs, safety considerations and resources available. Overall, no prohibited impairment that would harm the integrity of the park’s resources or values is anticipated.

4.8 LAND USE

All lands described in this report are either National Park lands or are within park boundaries and therefore administered by the NPS. The individual units are described in Section 2.1. Although most of the area managed by the NPS is owned by the Federal government or the Territory of Guam there are parcels of private lands within park boundaries. At present none of the private parcels are actively managed. Most of these private holdings are characterized as wildlands without development or access. Since it would be impossible to select fire management techniques for parcels with different ownerships private holdings will not be a major consideration when the FMP is developed.

4.8.1 Alternative 1 – No Action

The No Action Alternative will have little impact on land use. All fires would be aggressively suppressed regardless of the character of a specific unit a control strategy would be the default response for all fires rather than using tactics of confine or contain. Short-term and long-term impacts would be direct and minor concerning overall land use strategies.

4.8.2 Alternative 2 – Fire Management Unit Approach

As with other resources considered, the FMU approach offers more flexibility to NPS management strategies for each unit. Although overall land use would remain essentially the same as with the No Action Alternative, preservation and/or restoration of the historic scene, especially in wild areas could be enhanced through this alternative because of the flexibility in response strategies. Overall, short and long-term impacts to land use would be negligible (at or below detection). Overall, no impairment is anticipated under either alternative considered.

4.9 CUMULATIVE IMPACTS

CEQ regulations for implementing NEPA require assessment of cumulative effects in the decision-making process for federal projects. Cumulative effects are defined as “the impact on the environment which results from the incremental impact of the action when added to past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or persons undertakes such other actions” 40 CFR 1508.7). Cumulative effects were considered for both the no action and proposed fire management alternatives. At the time that this document was prepared, no other past, present or reasonably foreseeable future actions that might cause incremental impacts were anticipated.

4.9.1 Alternative 1 – No Action

Cumulative impacts under this alternative would be direct and beneficial in the short-term but potentially adverse in the long-term. In the short-term, full suppression would have the direct benefit of controlling the fire as a hazard to life and property. However, suppressing all fires regardless of conditions, management goals and ecological considerations may be counterproductive. This alternative, for example, could have a detrimental impact in areas where fire-dependent species are located and further upset vegetative patterns. This alternative does not meet the overall goals stated in the WAPA General Management Plan; it has the potential for detrimental impact in areas containing fire resistant species, it also presents the potential long-term impacts on soils as described in Section 4.2.1.

4.9.2 Alternative 2 – Fire Management Unit Approach

As stated earlier, wildland fire can be a desirable method to maintain fire-dependent systems. In areas where fire is an essential component but cannot be allowed to burn as a natural process because of management constraints, clearing and pile burning would be an alternative to full suppression. As with specific resources (biological, water, etc.) this preferred alternative would provide the NPS with the flexibility to respond using “appropriate” suppression responses (confine, contain, control) to fire events or take management actions to prevent the likelihood of fire in specific areas. Certain areas, such as wildland/urban interface areas, might call for both a fuels management and control suppression policy.

Under this alternative the WAPA FMP will be developed in such a way as to identify fire prone-areas, areas where recurring fires have had a serious effect on local vegetation and soils and special management zones and interface areas. It will detail the attendant response or management strategy for each FMU. The FMP will also detail consultation and protection measures to be taken before any pile burning or appropriate management response (response choices being confine contain or control). Cooperative relationships with the Guam Fire Department, the Guam Department of Agriculture Forestry Division, the Navy and other agencies will be reinforced. This is an important component as that many fires start on lands outside of the park on lands managed by these other agencies. In addition to response strategies the FMP will also address fire prevention; it will detail how the NPS will prevent unplanned, unauthorized, human-caused ignition through fire prevention and education programs for staff, the local communities and park visitors. The FMP will be a “living” document in that it will be reviewed yearly and modified as needed to respond to changing resources and ecological requirements.

Cumulative impacts under this alternative would be direct and beneficial in both the short and long-term. Based on the nature of cumulative effects that are foreseen, no impairment to park resources or values is anticipated.

Two other Executive Orders were considered when preparing this EA. They are:

- Executive Order 11990, Protection of Wetlands.
- Executive Order 11998 - Floodplain Management.

EO 11990 requires all Federal agencies to "take action to minimize the destruction, loss or degradation of wetlands and enhance the natural and beneficial values of wetlands" while

carrying out their responsibilities. EO 11998, Floodplain Management, requires similar protection for floodplains, including avoiding activity in the floodplain when possible.

None of the units contain wetlands. However, a small area near Apaca point in the Agat unit, which is within the Namu River floodplain, has been classified as a wetland under the Guam Coastal Management Program. Neither of the proposed alternatives would have any direct impact on this wetland.

Flood Maps issued by the Federal Emergency Management Agency, under the National Flood Insurance Program, show that both The Asan Beach Unit and the Agat Unit (including Apaca Point) lay within a 100-year flood zone. The type of zone for both units is identified as a 100-year coastal flood zone with velocity (wave action). Base flood elevations and flood hazard factors have not been determined. Neither of the proposed alternatives, nor the flood hazard determination, have any direct bearing on the development of the proposed FMP.

SECTION 5 – PUBLIC PARTICIPATION AND AGENCY COORDINATION

The National Park Service is the lead agency conducting the NEPA compliance process for this proposed Fire Management Plan for the War in the Pacific National Historical Park. It is the goal of the NPS to expedite the preparation and review of NEPA documents and to be responsive to the needs of Guam's residents while meeting both the spirit and intent of NEPA and complying with all NEPA provisions.

As part of the NEPA compliance requirements a scoping letter was distributed to both federal and government of Guam agencies that either had 1) expertise on resources potentially affected by the Proposed Alternative 2) regulatory authority over resources potentially affected by the Proposed Alternative. The letter was also distributed to the mayors of the Village of Agat and Asan, the communities adjacent to the park and a public notice of availability of the EA was posted in the Pacific Daily News, the major newspaper of Guam. The letter and a list of recipients are provided in Appendix (B). In addition to the letter, direct scoping meetings were held with interested parties, when this was not possible, the potentially interested parties were contacted by telephone or e-mail to make them aware of the EA/FMP preparation and solicit their input

A thirty-day public comment period will follow the distribution of this EA. All comments received will be duly considered in the environmental decision making process and accounted for in the FONSI that is anticipated; however, if potential significant issues are raised or impacts beyond those detailed in the EA are established than an EIS may be prepared.

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SECTION 7 – LIST OF PREPARERS

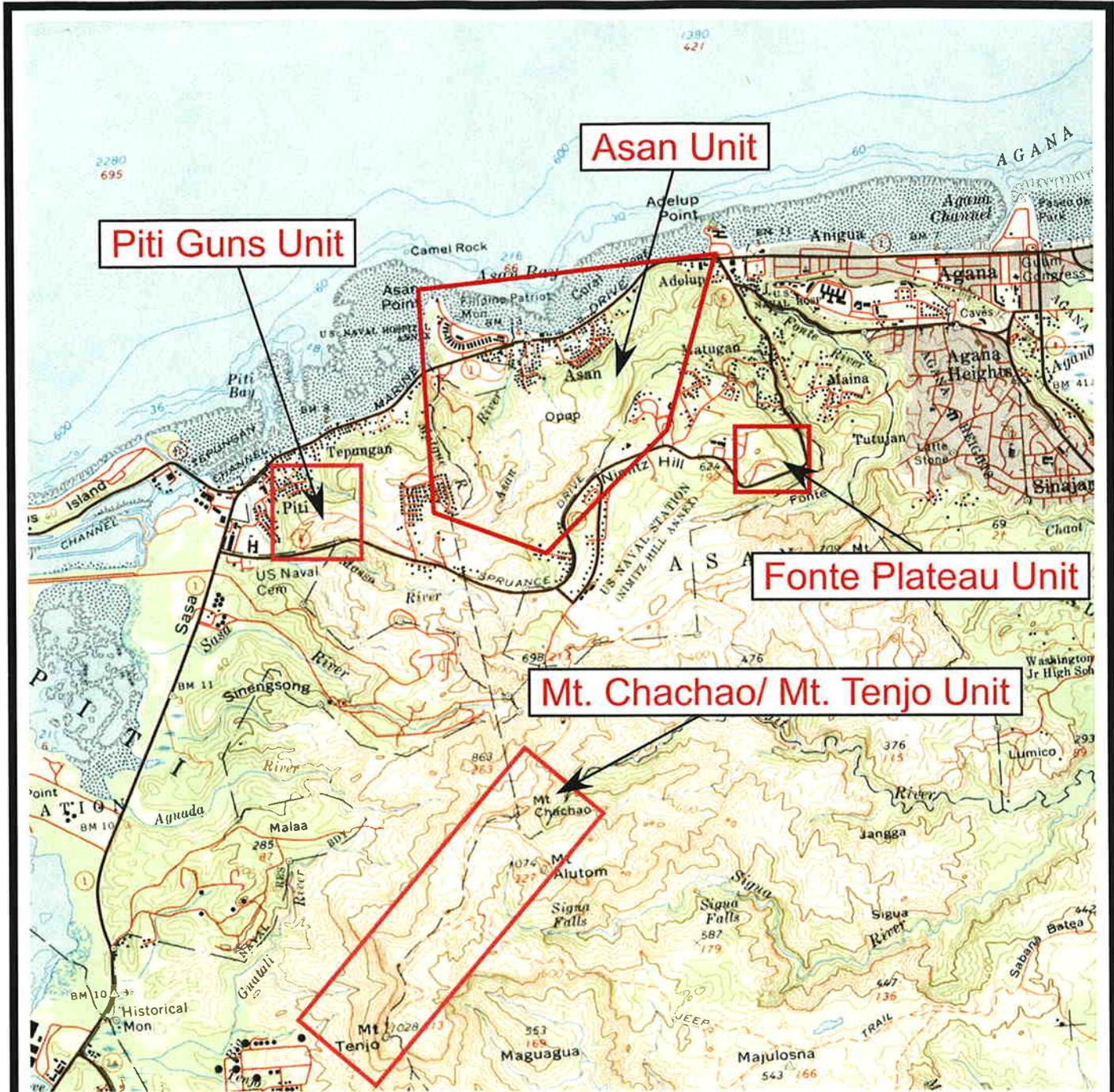
Rick Smith, of Hawai'i International Environmental Services, Inc, prepared this EA in consultation with the following War in the Pacific National Historical Park personnel:

Eric Brunnemann, Superintendent

Dwayne Minton, Ecologist/Project Manager

David Lintiaco, Head Forrester with the Guam Division of Forestry and Soil Resources, also provided valuable background information.

FIGURES



0  1 Mile

Scale 1:50,000



Source: U.S. Department of the Interior Geological Survey, 1977, Guam, Mariana Islands



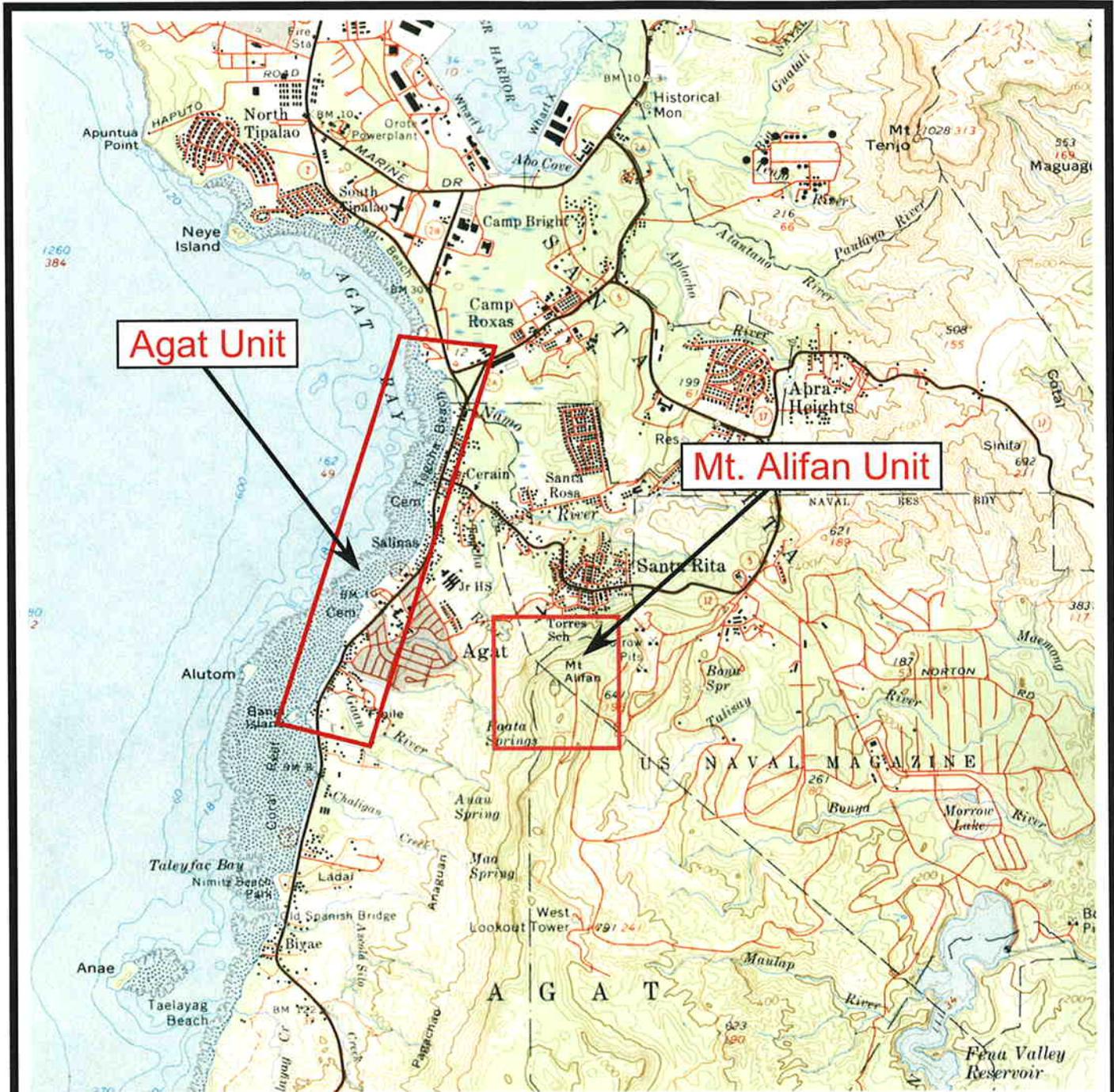
Site Area Topographic Map

Job No: 03065

War in the Pacific National Historical Park

Figure: 02

GSA Contract GS-10F-0132L



Agat Unit

Mt. Alifan Unit

0  1 Mile

Scale 1:50,000



Source: U.S. Department of the Interior Geological Survey, 1977, Guam, Mariana Islands



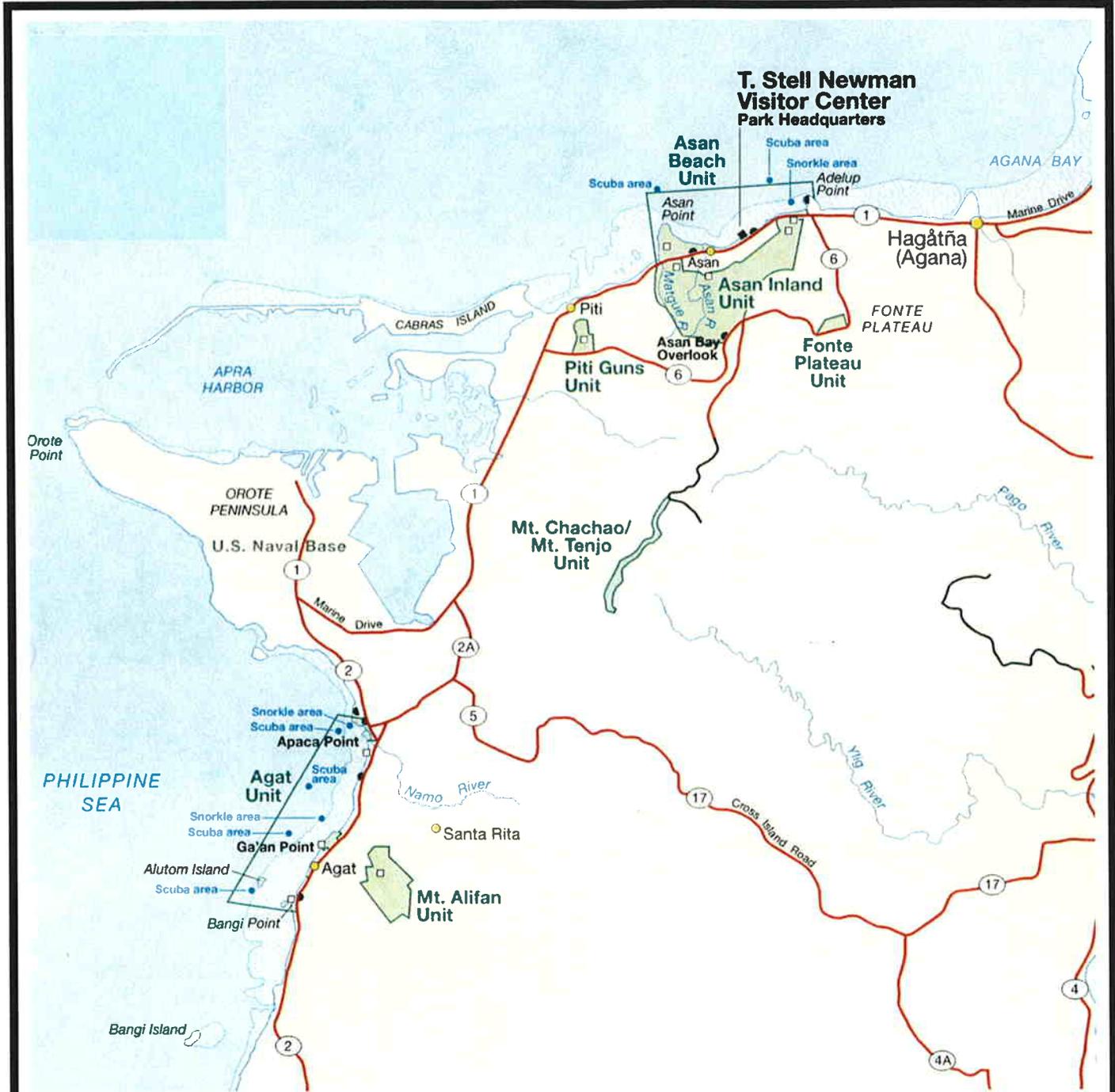
Site Area Topographic Map

Job No: 03065

War in the Pacific National Historical Park

Figure: 03

GSA Contract GS-10F-0132L



Source: National Park Service, U.S. Department of the Interior, War in the Pacific National Historical Park, Guam



HIES

Site Area Map

Job No: 03065

War in the Pacific National Historical Park

Figure: 04

GSA Contract GS-10F-0132L

Appendix A

Photographic Documentation



Plate 1 Asan Beach Unit is located just off Marine Drive between Adelup Point and Asan Point, approximately 2 miles from central Agana.



Plate 2 A view towards the Asan Beach landing area. The offshore reef area is also part of the park. The beach is 15 to 20 feet wide and the reef beyond is approximately 1000-foot wide, paralleling the entire shoreline



Plate 3 View from Asan landing beach toward the heights above. The landing was made under defensive fire from the ridge above. The invasion force had to move across the open land and scale the heights.



Plate 4. View from the heights (Asan Inland Unit) above the landing beach. Grass area along beach in upper right corner is the area where Plate 3 was taken. Towards the beach is jungle, the hills in the foreground are covered with sawgrass. This view is typical of the 1944 setting that the NPS wishes to preserve.

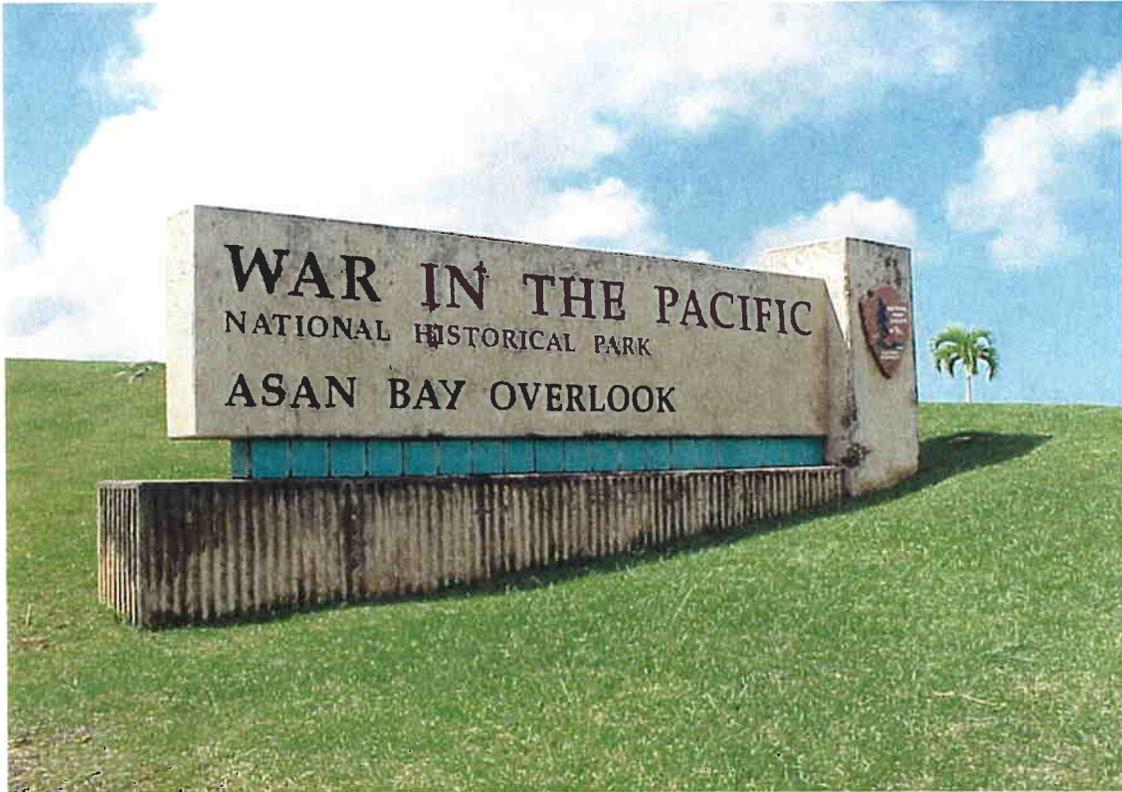


Plate 5 Asan Bay Overlook is located at the top of the ridge overlooking the Asan Inland Unit and the bay below (see Plate 4). In addition to the overlook itself a memorial area is located at this site.



Plate 6 Part of the memorial complex at the Asan Bay Overlook. The memorial area includes a section honoring those who fought in the battle and a memorial to the Guamanians who died during the occupation. The tablets along these walls include the names of those who died during the conflagration.



Plate 7 General Takashina's headquarters bunker on Fonte Plateau. There is a considerable variation of vegetation in this unit where forest and savanna meet.



Plate 8 Mangan Quarry, which is located adjacent to the bunker shown in Plate 7, includes one of the best examples of native limestone forest on the island.



Plate 9 An area of Fonte Plateau where sawgrass, tangantangan and other grasses, small shrubs, and trees mix to make an almost impenetrable forest landscape.



Plate 10 Sawgrass, tangantangan and coconut palm. The sawgrass is in excess of 6' high



Plate 11 The trail to the Piti Guns winds through a mahogany forest



Plate 12 One of the three Japanese coastal defense guns located in the Piti Unit



Plate 13 A view across Mount Chachao towards Mount Tenjo. Note the height and mass of the swordgrass.



Plate 14 An example of the savanna around Mount Tenjo, note the Ravine forest at the bottom of the the picture. The sawgrass that covers these hillsides has the height and mass of that shown in Plate 13, above.



Plate 15 From defensive positions on the high ground in the Mt. Chachao Mt. Tenjo area Japanese defenders had an excellent view of not only the landing beaches, but also Apra harbor and the Orote Peninsula as shown above. Note the scrub area in the foreground. This is what the ground cover becomes after successive fires.



Plate 16 Apaca Point, part of the Agat Beach Unit. The Agat landing beach is along the coast just above the large rock. This section includes a picnic area.



Plate 17 Agat landing Beach. This narrow coastal strip is where the American southern landings occurred. This park unit includes 557 acres water.



Plate 18 The caves in the foreground and the pillbox above are just a few of the Japanese defensive positions at Agat beach.



Plate 19 Agat Beach memorial area.



Plate 20 After establishing a beachhead, troops that landed at Agat troops had to move inland towards the high ground of Mt. Tenjo and Mt. Alifan, Note the badlands on the lower slopes of the mountain. Much of this badland development is directly attributed to recurring fires across the savanna.

Appendix B
Notification Letter and List of Recipients



HIES

HAWAI'I INTERNATIONAL ENVIRONMENTAL SERVICES, INC.

Earth Scientists and Environmental Engineers
Contractors License No. AC-21139

70 Kihapai St. Kailua, Hawai'i 96734 Phone (808) 263-4787 Fax (808) 263-0860

03065

April 30, 2004

1st Address Line

2nd Address Line

City, State, Zip Code

Attention: Name of Recipient

Subject: Environmental Assessment, Fire Management Alternatives,
War in the Pacific National Historical Park

(Title, or Last name):

Hawaii International Environmental Services [HIES] is in the process of preparing an Environmental Assessment [EA] for the National Park Service [NPS] under the National Environmental Policy Act. The purpose of the EA is to analyze alternative strategies for a Fire Management Plan that is to be developed for the War in the Pacific National Historical Monument [WAPA].

WAPA was established in 1978 to “commemorate the bravery and sacrifice of those participating in the campaigns of the Pacific Theater of World War II and to conserve and interpret outstanding natural, scenic, and historic values and objects of the island of Guam”. The park manages approximately 1000 acres of land, which are located in seven individual park units.

Wildland fires are a frequent event within the boundaries of the various park units, particularly during the dry season and burn as much as 20% of the park's land each year. Most fires are attributed to arson; natural fires are rare because of Guam's tropical setting. Few natural ignition sources are present in this environment and climatic conditions are not conducive to spontaneous ignition. As such, vegetation communities are poorly adapted to repeated burning, and are experiencing adverse impacts from repeated burning. Fires also contribute to upland erosion and coastal runoff. High sediment loads on near shore coral reefs are attributed to upland burning. The NPS is concerned about the health of both its terrestrial and marine natural resources, and currently lacks an approved fire management plan.

Two fire management alternatives are being considered, they are:

- **No Action** Although “No Action” implies that no action would be taken in the case of a wildfire, this is not the case. Federal policy requires that until a fire management plan is approved park service personnel must aggressively suppress all fires that occur within the park boundaries. Therefore, the No Action alternative would require that all fires be suppressed within park boundaries regardless of ecological concerns, resource management objectives and cost to the NPS. Suppression would be accomplished through the use of a dedicated NPS fire suppression team and through memorandums of understanding with the Guam Department of Forestry, the Guam Fire Department and other applicable fire response agencies.
- **Fire Management Unit Based Program** This alternative will address fire management by individual park unit. Fire management strategies of appropriate suppression and/or response will be based on ecological or park needs for that specific unit, taking into consideration such factors as to whether it is in an urban interface area, or a wild area, what ecological and cultural features are contained within that unit and what resources are available.

The NPS is accepting comments on the potential environmental impacts of this project. If you have any comments regarding wildfire management within WAPA please send them to my attention at the address in the letterhead.

Only written comments will be incorporated into the EA as appropriate. If you wish to remain on the mailing list and receive a copy of the EA, please note this in your communication; otherwise, you will not receive a copy of the EA. If your comments are to be included in the NEPA documentation I will need to receive your written response within 30 days of your receipt of the EA. I appreciate your time and look forward to receiving your comments. If you have any questions please feel free to call me at (808) 263-4787. Your comments may also be faxed to (808) 263 0860.

Respectfully,

Rick Smith

Project Manager
Hawaii International Environmental Services, Inc.

Distribution List for Project Notification

Name	Title	Agency	Address
Mr. David Limtiaco	Chief of Forestry	Guam Department of Agriculture Division of Forestry and Soil Resources	192 Dairy Road, Mangilao, Guam 96923
Mr. Gerry Deutscher	Refuge Manager	United States Department of the Interior Fish and Wildlife Service	P.O.Box 8134, Mou-3, Dededo, Guam 96929
Mr. Michael Uncango	Fire Chief	Guam Fire Department	P.O.Box 2950, Hagatna, Guam 96910
Mr. Gerry Davis	Supervisory Biologist	Guam Department of Agriculture Division of Aquatic and Wildlife Resources	192 Dairy Road, Mangilao, Guam 96913
Mr. Fred Castro	Administrator	Guam Environmental Protection Agency	P.O.Box 22439 GMF, Barrigada, Guam 96921
Mr. Joseph Borja	Director	Department of Land Management Attention: Chief Planner Planning Division	P.O.Box 2950, Hagatna, Guam 96932
Mr. Felix Berto-Dungca	Director	Chamorro Land Trust Commision	P.O.Box 2950, Hagatna, Guam 96932
Mr. Joseph W. Duenas	Acting Director	Department of Public Works	542 North Marine Drive, Tamuning, Guam 96913
Mr. Felix Camacho	Governor	Government of Guam	P.O. Box 2950, Hagatna, Guam 96932
Sen. Tina Muna-Barnes	Senator	Guam Legislature	155 Hesler Street, Hagatna, Guam 96932
Sen. Rory Respicio	Senator	Guam Legislature	155 Hesler Street, Hagatna, Guam 96910

Distribution List for Project Notification

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Mayor Paul McDonald	Mayor	Village of Agana Heights	P.O. Box 786, Hagatna, Guam 96932
Mayor Benny San Nicolas	Mayor	Village of Asan	P.O. Box 786, Hagatna, Guam 96932
Mayor Johnny Reyes	Mayor	Village of Agat	P.O. Box 786, Hagatna, Guam 96932
Mayor Isabel Haggard	Mayor	Village of Piti	P.O. Box 786, Hagatna, Guam 96932
Mr. Ron De Guzman	Director	Guam Housing and Urban Renewal Authority [GHURA]	117 Bien Venida Avenue, Sinajana, Guam 96910
Ms. Lynda B. Aguon	Historic Preservation Officer	Guam Historic Preservation Office	P.O. Box 2950, Hagatna, Guam 96932
Mr. Robert Wescom	Natural Resources Manager	United States Department of Agriculture	P.O. Box 2819, Hagatna, Guam 96932
Ms. Joan Perry	State Conservationist	United States Department of Agriculture	USDA 1 st H. Building Suite 301 400 Route 8 Mongmong, Guam 96910

